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JUN 11 1928

TWENTY-FIFTH YEAR

The Heating and Ventilating Magazine

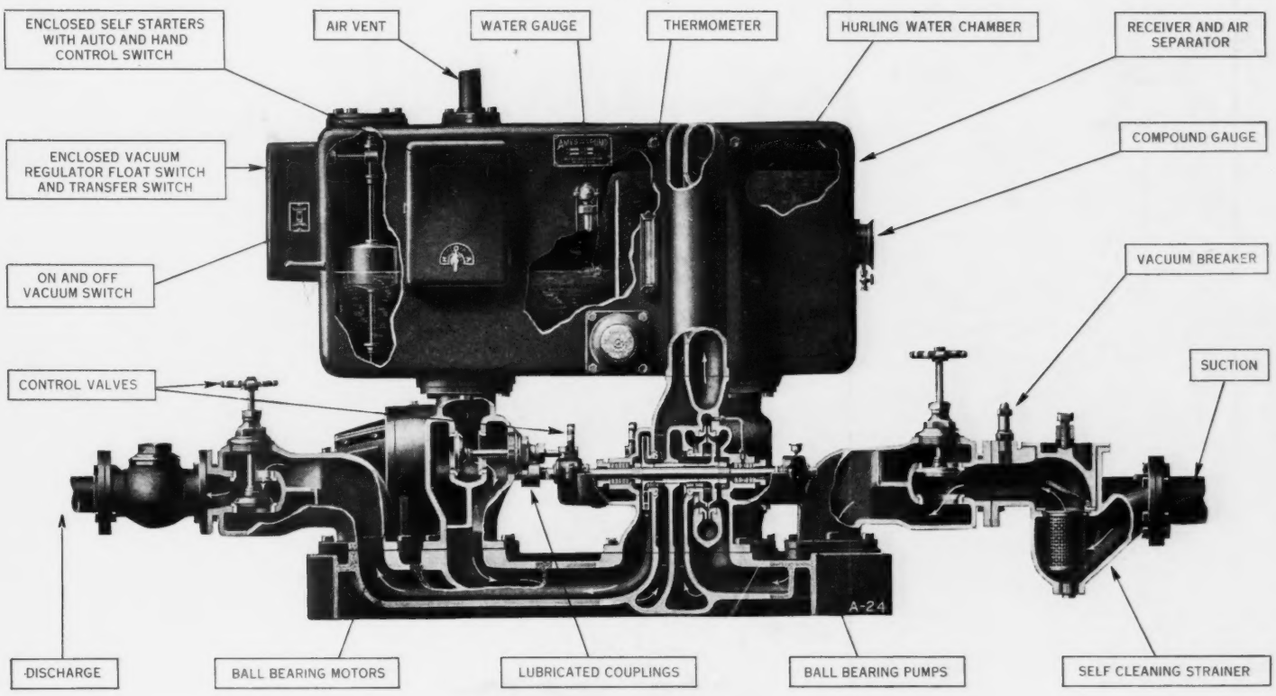
A Monthly Journal of Engineering Progress

Vol. XXV. No. 6.
$2.00 a year. 30 cents a copy.

JUNE, 1928

Heating & Ventilating Magazine Co.
386 Fourth Avenue, New York.

AMES DUPLEX VACUUM HEATING PUMP



No. 12 to 150 inclusive

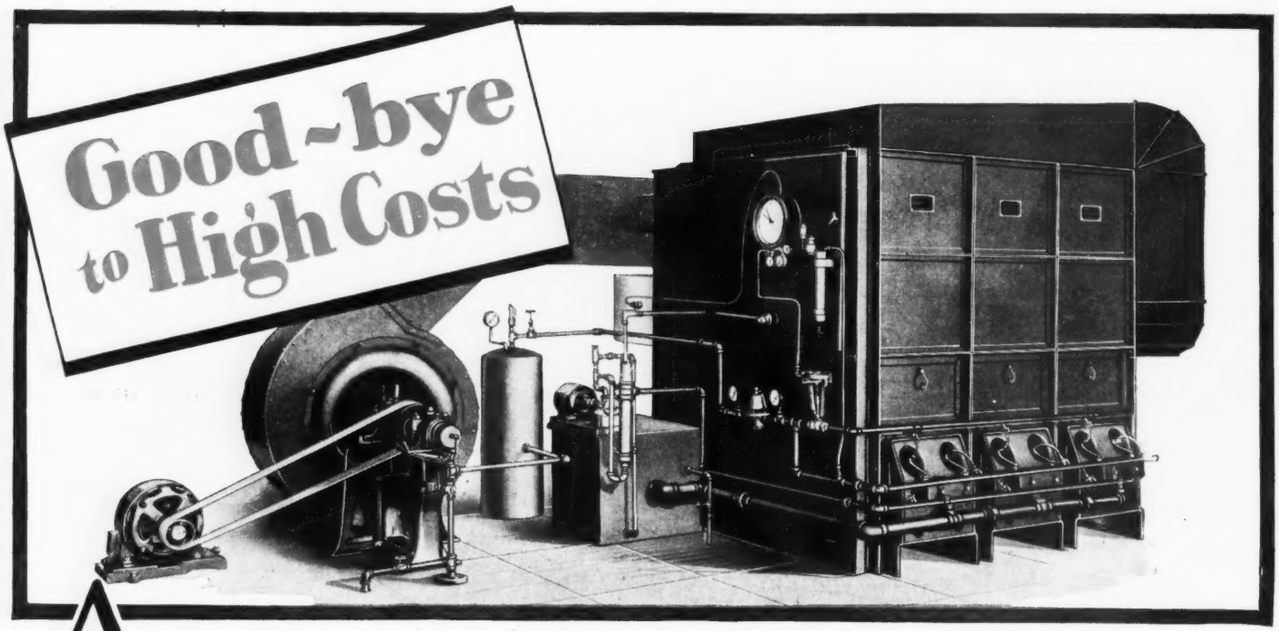
Write for Bulletin 52-C6

AMES PUMP COMPANY, Inc.

Division of STATEN ISLAND SHIPBUILDING CO.

90 West Street New York, N. Y.

DISTINCTIVELY DIFFERENT



A NEW SYSTEM FOR FACTORY HEATING

at a price that Hits Rock Bottom!

HERE, certainly, is equipment which deserves a place in economy programs. Clarage McCann Harrison Heaters save 15% to 20% in first cost.

The factory which adopts this modern system needs no boiler plant or its equipment, no steam or return lines, no pumps, traps or radiators: less equipment required—less expense involved. On one large job $50,000 was saved; on a small job, $3,000.

The Clarage System is direct fired, burning either oil or gas and delivering warm air under positive fan pressure. The heat is clean heat—no smoke, soot or cinders.

Nor is the economy confined to installation cost. Automatically controlled, this system cuts out labor charges—at least one engineer and one fireman eliminated. In operation it is 75% to 85% efficient.

Whatever your heating problem—new or old building, addition, one floor or one department—it will pay you to get in touch with us. Engineering recommendations and estimates furnished promptly. Use the coupon.

FACTS ABOUT THE CLARAGE SYSTEM

1-- Absolutely safe. Should supply fan stop, burners go out immediately and automatically. Should burner mechanism fail, safety shut-off valve cuts off oil supply automatically; no oil floodage possible.

2-- Unit type. Without costly alterations units may be added whenever more capacity is required.

3-- Installed within building to be heated. Usually upon raised platform, up out of the way.

4-- Burners non-clogging. No small openings or needle valves in entire system.

5-- High rate of heat transfer. Hot gases make two complete passes around heating elements.

6-- Combustion chamber of structural steel lined with refractory brick. Tile lining insures complete combustion and long service life.

7-- Satisfactory results. Sufficient installations already in operation in both large and small plants to prove the case.

CLARAGE FAN COMPANY, Kalamazoo, Michigan

Please send Catalog giving full details on Clarage McCann Harrison Heaters.

Name _____

Address _____

H & V 6-28

CLARAGE

McCANN HARRISON HEATERS

SAVE 15% TO 20% IN FIRST COST

KEWANEE STEEL BOILERS

Lower Heating Costs

The firebox of a boiler may be effective for making heat, but that of itself is not enough to insure efficiency. The boiler must be able to *use that heat.*

So, Kewanee provides unusually long travel for the flue gases, thus transferring useful heat to the water and making more steam to heat the building.

This means a distinct fuel saving, and is one of the reasons why Kewanee guarantees *lower heating costs.*

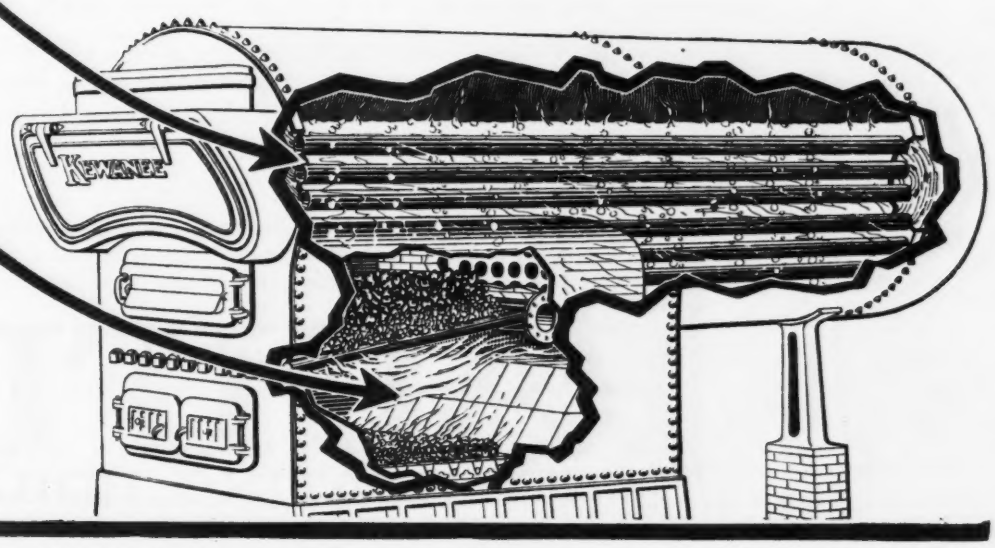
LONG TRAVEL OF FLUE GASES

This long travel of the hot flue gases gives the water in the Kewanee boiler a chance to absorb all the extra heat which would otherwise escape, up the stack, unused.

KEWANEE BOILER CORPORATION

Kewanee, Illinois

Branches in 40 Principal Cities

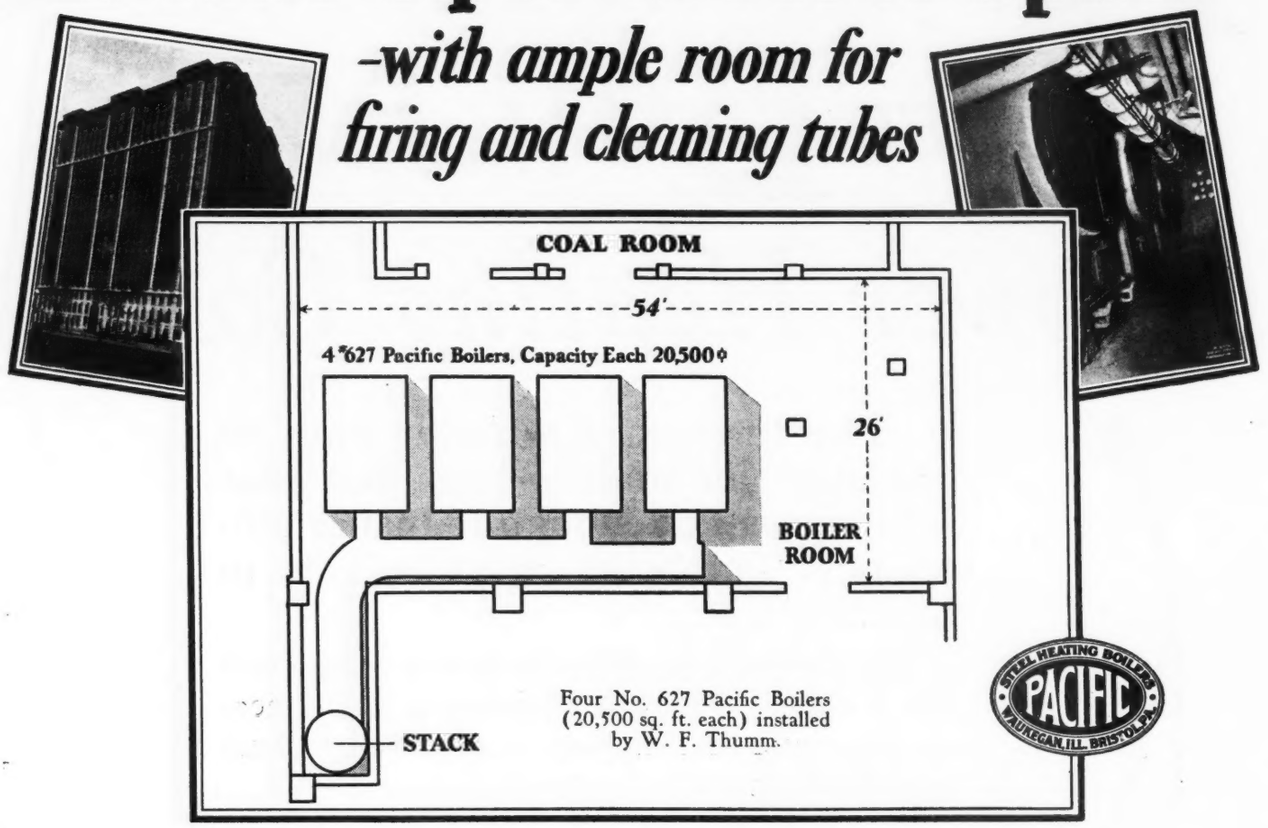


Second of a Series—explaining just why Kewanee Boilers Cut Fuel Costs.

THE HEATING AND VENTILATING MAGAZINE, published by THE HEATING AND VENTILATING MAGAZINE CO., at 386 Fourth Avenue, New York, N. Y. Subscription rates: United States, $2.00; Canada, $2.50; Foreign, $3.00. Single copies, 30 cents. Vol. XXV, No. 6, June, 1928. Entered as second-class matter, April 18, 1925, at the Post-Office at New York, N. Y., under the Act of March 3, 1879.

82,000 sq. ft. of Boiler Capacity in 1400 sq. ft. of Floor Space

—with ample room for firing and cleaning tubes



When Robert S. De Golyer Co., Architects, and H. L. Clute, Mechanical Engineer, designed this boiler room in the Carlson Building (Sheridan Road and Grace Streets, Chicago), they were confronted with a difficult problem. It was necessary to provide 82,000 sq. ft. of boiler capacity to heat the building — and floor space was at a premium.

The mechanical drawing above, taken from the original plans for this job, shows how they obtained maximum compactness with Pacific Steel Boilers. Only 1400 sq. ft. of floor space — yet there is ample room for hand firing and for cleaning tubes, also for easy access between the boilers.

This accomplishment of Messrs. De Golyer and Clute means something to you, because extravagance in using boiler room space shows an actual loss in dollars and cents. Elimination of this loss is possible only with boilers of the Pacific type, which are cleaned entirely from the front and have the smoke outlet at the rear.

Pacific Boilers combine these advantages with remarkably high efficiency and the strongest type of construction yet developed — steel, electric arc welded. Ask for report of operating test.

PACIFIC

STEEL HEATING BOILERS

Factories: WAUKEGAN, ILL., BRISTOL, PA.

PAGE BOILERS

"Distinguished Service"

Monarch Boilers are designed for the heating of larger buildings, and are made in a wide range of sizes, up to the big 60″ double section boiler, capable of carrying the heaviest of loads demanded in a low-pressure heating system.

Monarch Boilers are adapted for burning economically any available fuel—hard or soft coal, smokelessly, and with equally good results. In the burning of oil, too, the Monarch is every day proving to be exceptionally economical. Because the sectional construction of Monarch Boilers will permit of their being made up into long sizes, with the resulting longer fire travel, they lend themselves admirably to use with oil-burners.

THE WM. H. PAGE BOILER CO.

General Offices: 200 Madison Ave., New York

Boston Cleveland Philadelphia Brooklyn Washington Meadville

Send for our 1928 Catalog, and prices which are most favorable.

UNDERBIDDING
is poor fuel for
OVERHEAD

Underbidding for volume is like burning down the house to heat it. The more heat the less house. The more volume you get by too low bidding, the more money you lose.

There is a way to beat competition in the heating business. That is to merchandise a specialty. The one real specialty of this business is the Spencer Heater.

Show any prospect how much it saves by burning No. 1 Buckwheat anthracite instead of domestic sizes. Show how its magazine feed saves time, labor, and in large buildings, the cost of a night fireman. Anyone will gladly pay the slightly higher cost of a Spencer for the fuel savings it makes.

That "slightly higher cost" means more profit for you. The larger the sale, the larger the profit—and you get all your profit, too. You don't have to whittle prices down to get the bid. Try submitting an alternative bid on your next heating system prospect, and see how easy it is to lift yourself out of competition.

SPENCER SAVES

Spencer
steam, vapor or hot water
Heaters
burn No. 1 Buckwheat Coal

SPENCER HEATER COMPANY *General Offices:* WILLIAMSPORT, PA.
New York City Boston Philadelphia Baltimore Buffalo Rochester Hartford Albany Syracuse Scranton
Division of Lycoming Manufacturing Company

STEAM CAPACITIES:—Cast Iron Sectional *from 600 feet to 3,200 feet.* Steel Tubular *from 2,000 feet to 16,000 feet*

TITUSVILLE

Titusville Type WS boilers are installed in this new ultra-modern Chicago apartment building.

Downdraft Smokeless Boilers
"Series W.S."

¶ The especially designed downdraft grates of this type of Titusville Boiler used in the Gordon Apartment Building in Chicago incorporates the very best smoke eliminating device yet developed for bituminous coal.

¶ The percentage of combustible gases which ordinarily escape up the smokestack are thoroughly burned giving the maximum heat units per pound of coal and assuring the utmost fuel economy.

¶ Heating engineers and building contractors will find it profitably interesting to investigate the many superior advantages of this electrically welded boiler. It is a new and progressive product of a pioneer boiler manufacturer of national repute.

Sales Offices:

New York
152 W. 42nd Street

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111 W. Monroe Street

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204 Owen Building

Buffalo, N. Y.
Marine Trust Building

Washington, D. C.
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118 St. Clair,
East Cleveland, O.

Pittsburgh, Pa.
Farmers Bank Building

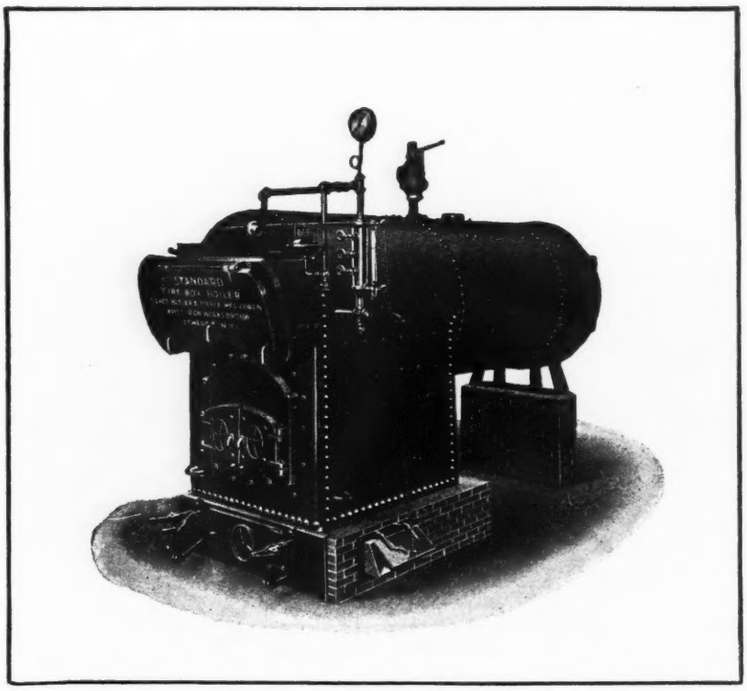
Charlotte, N. C.
705 Realty Building

Los Angeles, Calif.
940 Maple Avenue

St. Louis Mo.
401-2 Bank of
Commerce Building

THE TITUSVILLE IRON WORKS COMPANY
TITUSVILLE, PENNA.

AMES



FIREBOX HEATING BOILERS

AMES IRON WORKS

Division of

PIERCE, BUTLER & PIERCE

MANUFACTURING CORPORATION

Main Office and Works

OSWEGO, N. Y.

General Sales Offices

41 EAST 42nd STREET, NEW YORK CITY

Watch your SMOKESTACK

It does not take technical engineering knowledge to measure the efficiency of boiler operation from smokestack discharge. Smoke is unconsumed fuel. Unconsumed fuel—is money flying away.

Where no smoke is in evidence the temperature of the gases within the stack too often shows a tremendous waste of heat units.

The real cost of a boiler is its initial purchase price plus installation cost—plus its fuel waste.

The rapid water circulation of the Stanwood Boiler absorbs a maximum amount of heat from combustion just as a rapid flowing mountain stream absorbs its chill from the atmosphere. More heat units are put to use. Few escape to go up and out the smokestack. There is more steam made per pound of coal when a Stanwood is used. Economy and efficiency combined.

Check up on your boiler today. Take the smokestack temperature, measure coal consumption and actual horsepower delivered. The saving effected by the installation of a Stanwood often pays for itself in a few months, with years of economical service thereafter as extra profit.

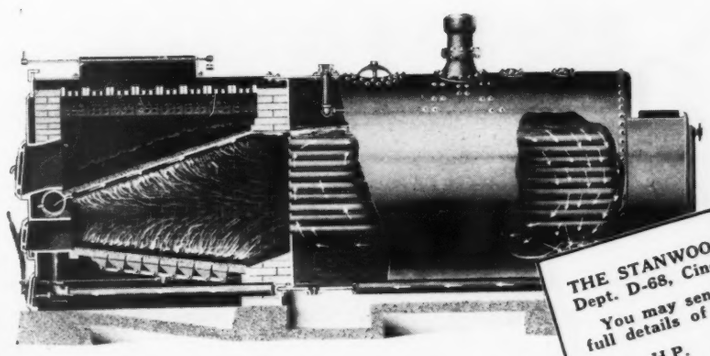
STANWOOD *Smokeless* BOILERS

ALL STEEL RIVETED CONSTRUCTION

THE STANWOOD CORPORATION

Manufacturers of Smokeless Boilers, Horizontal Return Tube Boilers, Stacks, Breechings, Tanks, Feed Water Heaters, and Throttling and Automatic Steam Engines. Est. 1891 CINCINNATI, O.

29 to 250 H.P.
(3,500 to 31,000 sq. ft. steam radiation)
15, 100, 125, 150 lbs. working pressures or higher if desired.



Rapid water circulation is but one of the outstanding features which mark Stanwood Boiler supremacy. There are other reasons you should know about. Write for them today or simply mail coupon below.

Offices in Principal Cities

THE STANWOOD CORP.
Dept. D-68, Cincinnati, O.
You may send, without obligation, full details of the Stanwood Boiler.
.....H.P. .....Pressure.
Name .....
Address .....

"It is our purpose to

PROTECT

the Heating Contractor . ."

WE propose to sell our product only to responsible heating contractors ... or to legitimate plumbing and heating supply jobbers. It is our purpose *to protect the heating contractor in the sale of our product so that he may make a profit on his sale of that product.*"

This is our definite policy—past, present, and future—that has ever activated our efforts. The heating contractor has always been assured of our loyal support in building toward his bigger success and greater prosperity.

Satisfaction in his relations with the United States Radiator Corporation is certified just as surely as Guaranteed Heating certifies his satisfaction in Capitol Boilers.

United States Radiator Corporation - Detroit, Michigan

Guaranteed Heating WITH

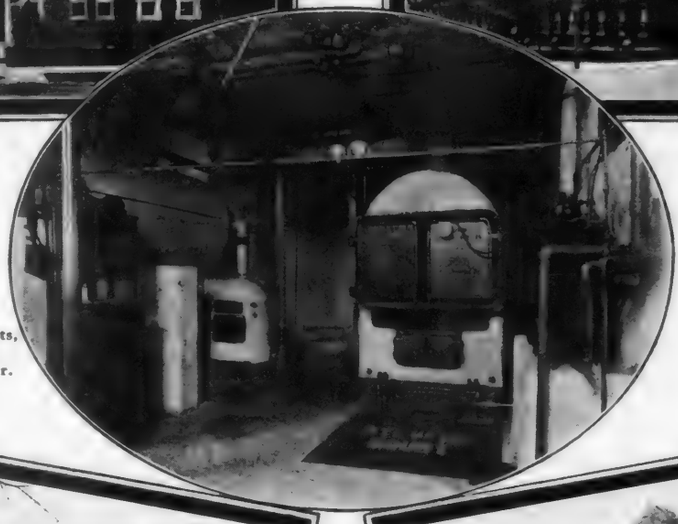
Capitol Boilers

AND RADIATORS

ROSS STEEL BOILERS

Salisbury Apartments,
Richmond Hill, Long Island.
Benjamin Felder,
Heating Contractor.

Forest Chateau Apartments,
Forest Parkway, Long Island.
John C. Newton,
Heating Contractor.



At right—
Stevens Court Apartments,
Astoria, Long, Island.
Geo. Tippett, Contractor.

Hannan Apartments,
Detroit, Mich.
John Hannan, Heating Contractor.

Serota-Rita Court Apartments,
Brooklyn, N. Y.
John C. Newton, Heating Contractor.

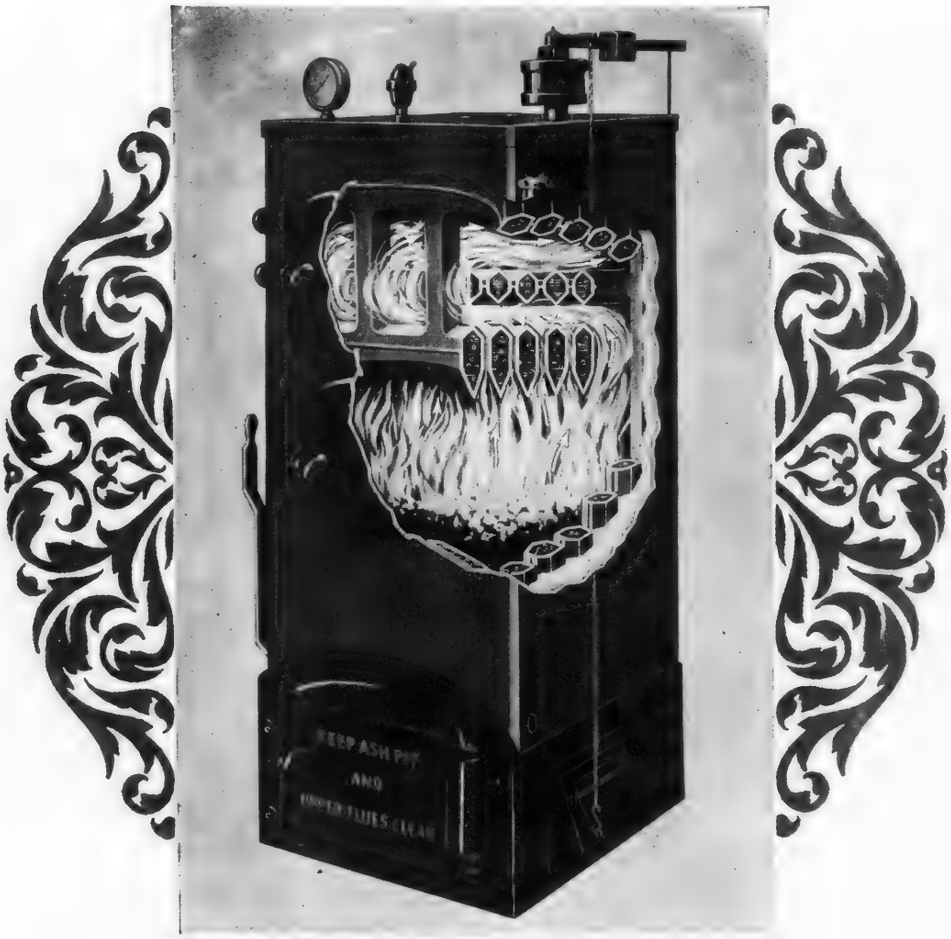
At right—
Anscot Apartments,
Brooklyn, N. Y.
Ashford Plumbing Co., Heating Contractors.

The newer apartments are using ROSS STEEL HEATING BOILERS because they are so economical, efficient, and built to outlast the buildings.

The Frost Manufacturing Co. .. *Galesburg, Illinois*

SINCE 1851

Branches in Most Leading Cities



The exceptionally deep fire box permits heavy fuel charges, gives ample space for proper combustion, and makes long firing periods possible. Long fire travel promotes maximum heat transfer, boosts effectiveness. A thick layer of rock wool insulation decreases heat loss.

GOOD LOOKING . . . . BUT AFTER ALL, ITS MAIN JOB IS HEATING!

COLOR helps to sell a boiler in the show room, helps to lift it from the drab and commonplace. Hence the durable, dirt defying empire green finish, with trimmings of glossy black, on the National Jacketed Boiler. It's a fine looking unit—there is none better.

But, after all, a boiler's job is to keep the building warm—not just to add snap to the basement. So the National Boiler *inside the jacket* was exhaustively tested, and the factors of its dependability, economy and convenience conclusively demonstrated before it was marketed.

The National Jacketed Boiler's *appearance* proves its attractiveness; its *record* proves its performance; the fact that it's a *National Product* gives assurance of complete and lasting satisfaction.

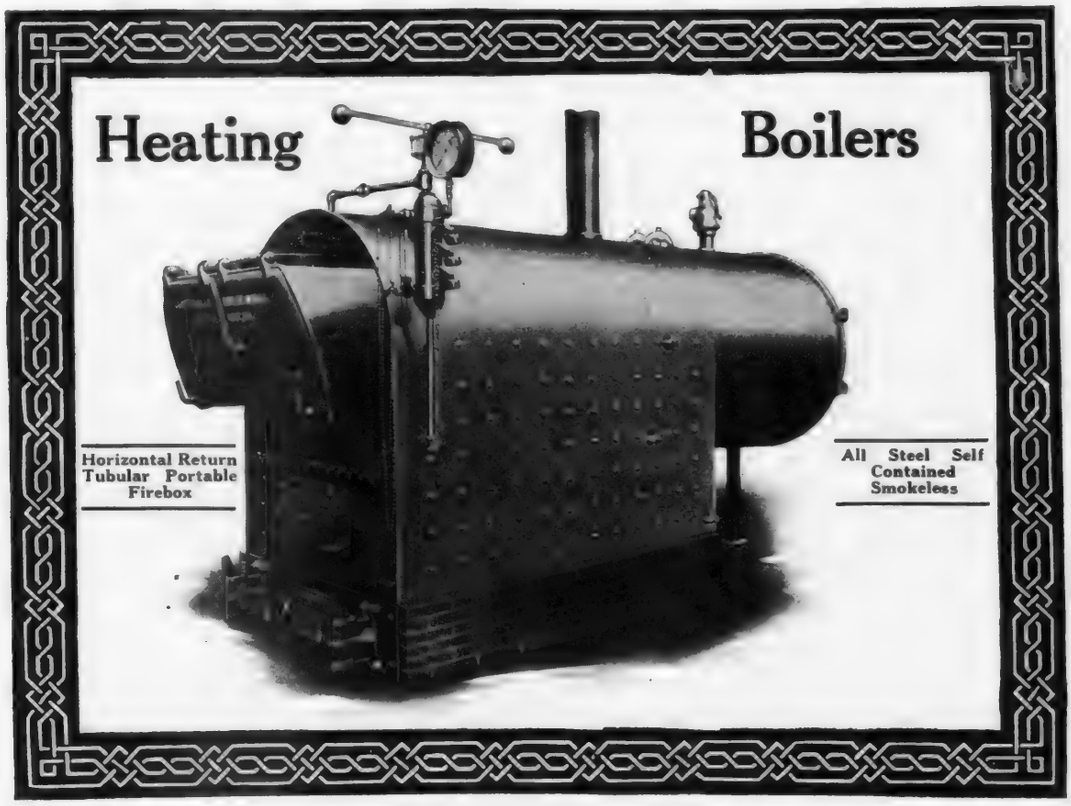
NATIONAL RADIATOR CORPORATION

Ten Plants devoted to National Service through these Branch Offices and Warehouses:

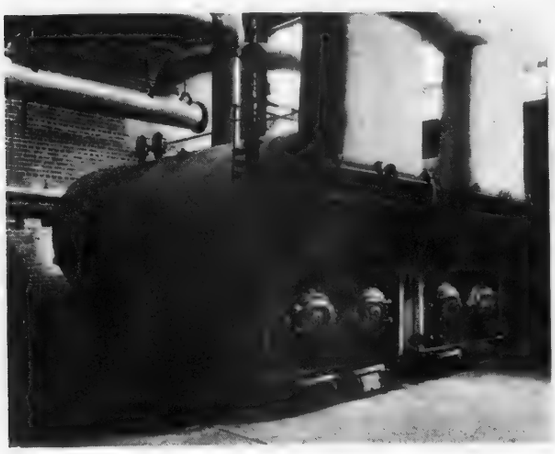
Baltimore, Md.—2622 Frisby Street
Boston, Mass.—93-97 Oliver Street
Buffalo, N. Y.—259-265 Delaware Avenue
Chicago, Ill.—2445 N. Keeler Avenue
Cleveland, Ohio—935 E. 63rd Street
Cincinnati, Ohio—Spring Grove and Elmira Avenue
Indianapolis, Ind.—431 W. Georgia Street
Johnstown, Pa.—221 Central Ave.
Louisville, Ky.—1126 W. Breckenridge St.
New York, N. Y.—55 W. 42nd St.
Omaha, Neb.—108-112 S. Tenth St.
Pittsburgh, Pa.—1509 Arrott Building
Richmond, Va.—3032 Norfolk St.
Washington, D. C.—2205 Fifth Street, N. E.
Milwaukee, Wis.—124-130 Jefferson St.
Philadelphia, Pa.—121 N. Broad St.
St. Louis, Mo.—1042 Central Industrial St.

AERO

NATIONAL JACKETED BOILER



"Boilers by Coatesville," —*enough said*



Above—Two Series "A" Coatesville All-Steel Heating Boilers installed in the new Philadelphia College of Pharmacy. Architect, Norman Hulme. Engineers, Calvert & Barnes. Heating Contractor, Nicholas Connolly.

Above—Three Coatesville H. R. T. Boilers, 150 lbs. pressure installed in the Plant of the Manhattan Soap Co. of Bristol, Pa. These Boilers are used for power and processing purposes.

"LITERATURE UPON REQUEST"

"Steel insures Strength and Security"

BOILERS

Horizontal Return Tubular.

Coatesville Oil Burning.

Scotch Marine.

COATESVILLE BOILER WORKS

Main Office and Works—COATESVILLE, PA.

Philadelphia 111 S. 15th St. | New York 30 Church St. | Boston 141 Milk St.
Pittsburgh Union Trust Bldg. | Baltimore Lexington Bldg. | Newark 60 Park Place
San Francisco 945 Pine St.

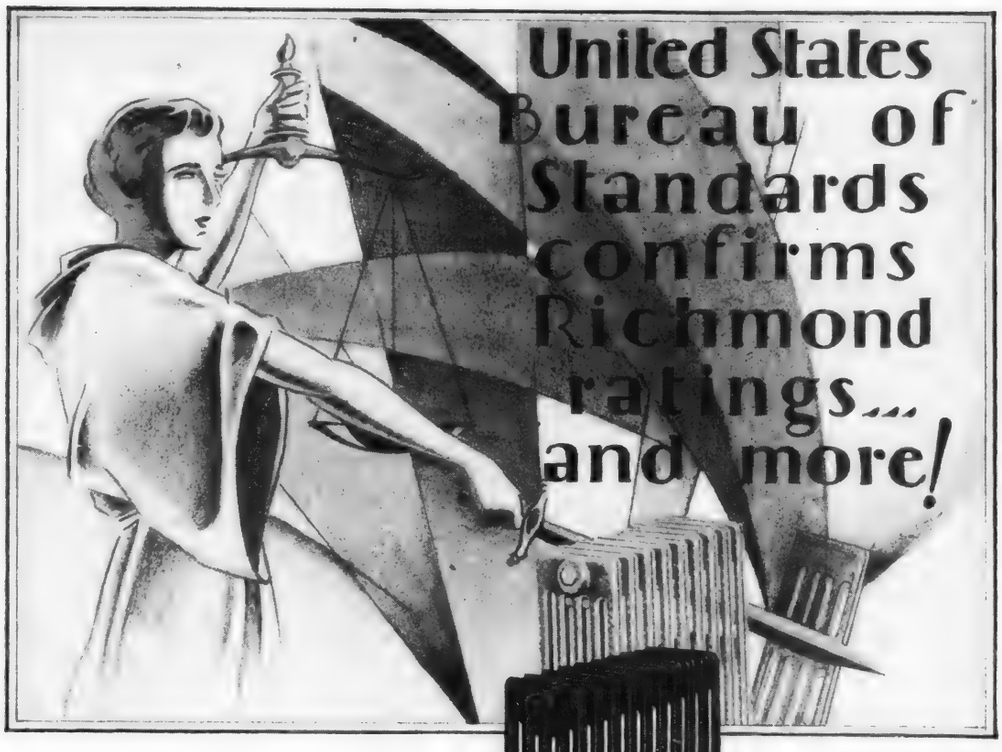
BOILERS

Portable Firebox H.R.T.

Vertical.

Special Heating.

Boilers - Tanks - Steel Plate Work



IT is a rare thing to have the product exceed the promise. The Bureau of Standards of the United States, in a report recently issued to the Treasury Department, places a higher rating on certain Richmond radiators than we do—and will accept them for its own buildings at various ratings which exceed ours as much as 8½%.

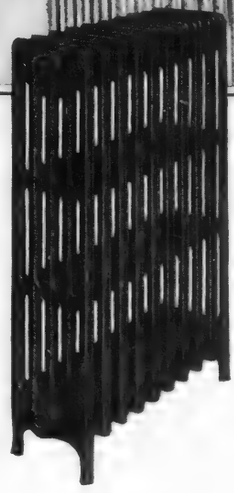
For example:—

	Our Catalogue Rating	Government Rating
38″—5 tube	5 sq. ft.	5.4 sq. ft.
38″—7 tube	7 sq. ft.	7.6 sq. ft.

This means that the Government accepts a 10 section 38-5 tube Richmond radiator as 54 sq. ft. and a 10 section 38-7 tube Richmond radiator as 76 sq. ft.

A ten section Richmond Tube Radiator on the Government rating will take the place of an eleven section radiator of some other makes.

We sometimes feel that it is difficult to do justice to Richmond radiators in the limitations of an advertisement. Still, there is nothing more desirable than a reputation for reserve.



RECENT GOVERNMENT TESTS PROVE RICHMOND RADIATORS ARE BETTER THAN OUR CONSERVATIVE RATINGS

We feel that the U. S. Bureau of Standards has done something for Richmond radiators that we ourselves would never have done. It will not, however, affect our future catalog ratings—you will always find them underrated rather than overrated. Incidentally, Richmond publishes its radiation ratings in B.T.U. As far as we know we are the only company publishing radiation ratings based on condensation tests.

Let us show you how to get 105 to 110 sq. ft. of radiation at a cost of 100 sq. ft. You can get more contracts by using our guaranteed B.T.U. ratings. They allow of no compromise with competition—at even prices the buyer always gets 5 to 10% greater value in Richmond radiation . . . That is something to remember! Send for catalog.

RICHMOND RADIATOR COMPANY
INCORPORATED
Executive Offices: 1480 Broadway, New York
Boiler Factory: Norwich, Conn.

BRANCH OFFICES:
1010 Wrigley Building, Chicago
2241 North American Street, Philadelphia
480 Park Square Building, Boston
Cedar Avenue and Ashland Road, Cleveland

COIL

STEEL HEATING BOILERS AND WATER HEATERS

FOR OIL BURNING

It is the amount of heating surface, provided it is properly placed in relation to the fire, that determines the amount of oil used to heat your building. The amount of heating surface per unit of rating in the Coil Boiler is exceptionally high and it is tremendously effective because it is "within view" of the flame, hence, capable of absorbing the radiant heat.

WRITE FOR CATALOG

MONITOR BOILER COMPANY

1505 Race Street :: Philadelphia, Pa.

TAYLOR ALLDERDICE HIGH SCHOOL
Architect: Robert Morris Trimble
General Contractors: H. Miller & Sons Co.
Heating Contractors: P.E. Geisler & Company
Plumbing Contractors: Mass & Easley Plumbing Co.

Building the High School for Generations to come!

Recent years have brought a marked improvement in our grade and high school buildings. In the march of progress in buildings generally, the high school has undergone practically a complete change in both architectural design and interior plan.

From the modest "school house" of yesterday has come the "institution" of today. Beautiful in outward appearance—efficiently planned within—the modern school building reflects the trend of modern thought in meeting today's needs and anticipating tomorrow's requirements.

In keeping with architectural achievement, engineering skill has been diligently applied—the hand of genius is seen in the specifications for various materials used. Behind the walls and beneath the floors is one of the most important of these materials—a vast net work of pipe lines. There could be no substitute for quality here. Efficient service and long life were factors carefully considered and only pipe which bore unmistakably a reputation for proven quality received consideration.

It is significant that in many of America's modern school buildings "NATIONAL" Pipe has been generously used.

The Taylor Allderdice High School in Pittsburgh illustrated above is one of the many schools throughout the country in which "NATIONAL" Pipe has been installed.

NATIONAL TUBE COMPANY

Frick Building, Pittsburgh, Pa.

DISTRICT SALES OFFICES IN THE LARGER CITIES

"NATIONAL"

On almost any heating job, one of these

GAS BOILERS

is cleaner, more convenient and more profitable

to you!

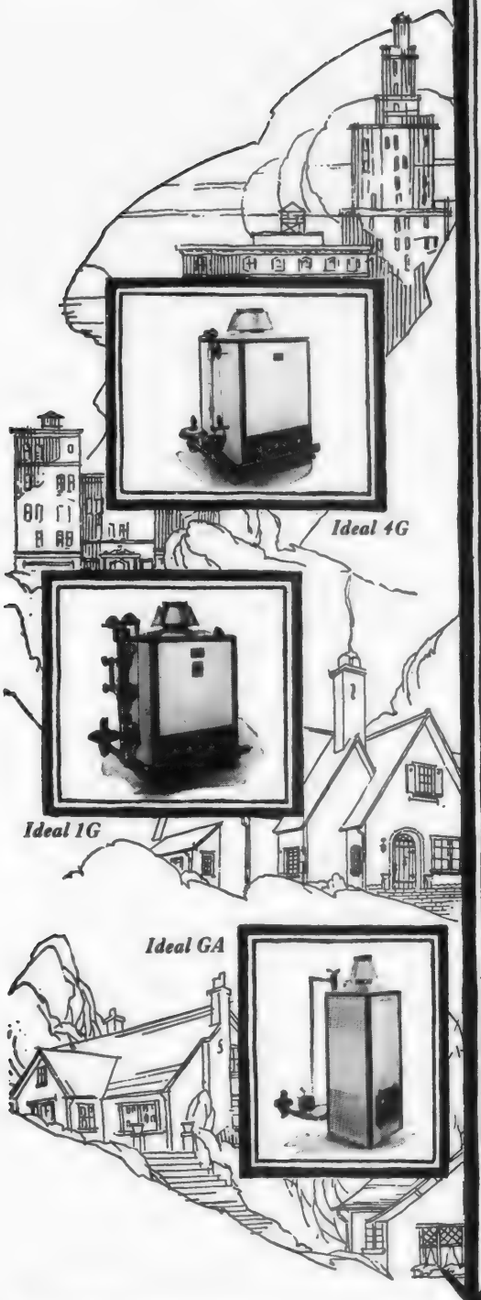
For cottages or bungalows — with or without basements — an Ideal Arcola Gas Heater!

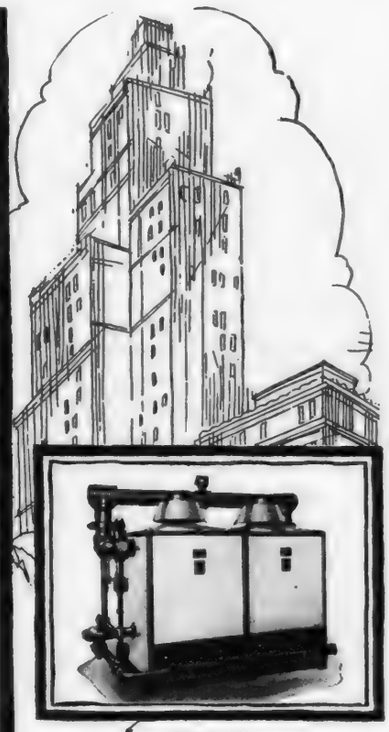
For small or medium-sized homes —Ideal 1G Gas Boiler!

For larger homes and buildings — Ideal 4G Gas Boiler!

For office buildings, big apartment houses, hotels — Ideal 4G Gas Boilers in multiple units

All these boilers are useful for large-volume hot-water supply and industrial applications.





LET your better customers know what it means to live in a house automatically heated by an Ideal Gas Boiler!

More and more gas companies are establishing special rates for heating, and cooperating with contractors. This means a clean net profit for you on every job. The gas company takes care of call-backs and service.

A complete range of boilers for every heating job—from a model cottage to the largest building.

Write for details

IDEAL GAS BOILERS

Product of AMERICAN RADIATOR COMPANY *Gas Utilization Dept.*

Write to AMERICAN GAS PRODUCTS CORPORATION, *Distributors*

376 Lafayette Street, New York City

Why Do They Use ROBRAS 20-20 Radiators?

One User Answers—

RHINELANDER REAL ESTATE COMPANY.
31 NASSAU STREET

POST OFFICE BOX 258, CITY HALL
TELEPHONE 4371 RECTOR.
FRANCIS M. VALK, MANAGER

WILLIAM R. STEWART, PRESIDENT
PHILIP RHINELANDER, VICE PRESIDENT
T. J. OAKLEY RHINELANDER 2ND, ASST. TREASURER
PHILIP RHINELANDER STEWART, JR., SECRETARY
WM. RHINELANDER STEWART, JR., SECRETARY

NEW YORK

April
Eighteenth
Nineteen
Twenty-Eight.

Donald Noakes
Rome Brass Radiator Corp.
1 East 42nd St.
New York City

My dear Mr. Noakes:

Six months ago, when you assured me that your Robras 20-20 concealed radiator would appreciably decrease renting resistance and offset the fairly high rentals we expected from the Rhinelander apartments, I was rather skeptical.

However, time has proven your statements.

The apartments in this building have rented with surprising ease. No small amount of credit for this should go to your, in the wall, out of the way, radiators. Never in my long experience in renting high class apartments have I had a selling point so understood and appreciated by prospective tenants.

Please accept my thanks for bringing this radiator to my attention. I am,

Very sincerely.

Francis M. Valk

Manager.

In the Rhinelander Apartment mentioned above, twenty-seven thousand feet of Robras 20-20 radiation is used. It was designed by SUGERMAN & BERGER, architects for the Rhinelander Real Estate Company. The general contractors were the TAYLOR CONSTRUCTION COMPANY. The Heating System was laid out by JAROS & BAUM, Heating and Ventilating Engineers, and installed by GEORGE E. GIBSON CO., Heating Contractor.

ROME BRASS RADIATOR
CORPORATION

ONE EAST FORTY-SECOND STREET ∴ ∴ ∴ ∴ ∴ ∴ NEW YORK

with

BARBER Patented JET GAS BURNERS

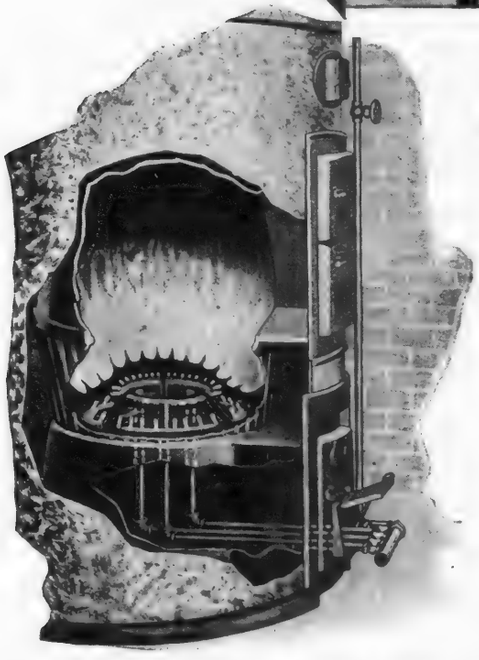
Set up this Demonstrating Outfit in your Show Room. It is a real "business getter"—and a time saver, too. With it you quickly clinch the sale, for you can readily show your prospective customers the many Exclusive Features and Outstanding Advantages of Barber CONVERSION Burners.

It makes it easy to show how anyone can enjoy all the comforts, cleanliness and convenience of a Gas Heating System without buying a new gas-fired boiler or furnace.

This is a "banner year" for Conversion Work. Go after your share of the profits right now. You can sell many installations during the Summer months—and your activities during these months will create a big list of "Prospects" that will surely place orders with the first chilly blasts of Fall weather.

Our Catalog No. 28 and the Demonstrating Outfit, together with our Sales Co-operation, enables you to add a very profitable source of income to your business.

WRITE US TODAY



Illustrating the 3-R-17 Burner assembly properly installed in a warm air furnace. The same idea is carried out in a round boiler; that is, by placing the burner low in the fire box, the longest possible heat travel is obtained, also a greater area is provided for combustion and radiating surface. This permits a closer checking of the draft and more baffling, all of which results in exceptionally high efficiency.

Among the Manufacturers who have adopted Barber Burners as Standard in their Hot Water Heaters, Boilers and Appliances are the following:

Akron Equipment Company
American Radiator Co.
Armbruster & Betlem
Arthur & Fowler Co.
F. C. Barton Co.
Bastian-Morley Co.
Bean Spray Pump Co.
Bryan Steam Corp.
Carrier Construction Co., Inc.
Champion Dish Washing Machine Co.
Coast Heater Mfg. Co.
Day & Night Water Heater Co.
Economy Heater Co.
The Electro Weld Co.
Firestone Tire & Rubber Co.
Franklin Plumbing Supply Co.
R. E. Fraser & Co.
Geneva Heater Co.
Gewert Mfg. Co.
E. A. Hibbs
Hoffman Heater Co.
Hollywood Water Heater Co.
Holstream Heater Co.
Hoyt Heater Co.
Edward Katzinger Co.
Lovekin Water Heater Co.
Marlow Manufacturing Co.
McCann-Harrison Co.
Merit Mfg. Co.
Walter Mork Co.
Newell Mfg. Co.
New Way Mfg. Co.
Northwestern Steel & Iron Works
The Ohio Heater Co.
Geo. F. Reichman & Co.
Safety Water Heater Co.
Sands Mfg. Co.
Schwab Boiler & Machine Co.
Snap-O-Stat Co.
Star Dee Water Heater Co.
Stinson Sales Co., Inc.
John Trageser Steam Copper Works
United Heater Corp.
Vernon Edler Corp.
Ward Heater Co.
Weil-McLain Co.
Welsbach Company
D. D. Wessels & Sons Co.
The Williams Foundry Machine Co.
The Wise Furnace Co

Hundreds of your customers are ready to have you convert their Coal or Oil heating systems to Gas-fired ones.

GO AFTER THIS CONVERSION BUSINESS NOW!

The CLEVELAND GAS BURNER & APPLIANCE CO.

Burner Specialists

3702-04 Superior Avenue, Cleveland, Ohio

"At last! A low priced, practical steam (or air) Meter."

"Just what we've wanted."

"We'll need some of those."

Comments such as these have been followed by orders to serve over 20 different industries.

This result is only natural, for here is a simple, compact, economical Meter which accurately measures the flow of high or low pressure steam or air over an exceptionally wide range.

These Meters are used to measure steam used for heating; steam and air used in process work; steam sold to tenants or near-by buildings; for use as a test meter to check steam distribution, etc.

Install it right in the line (as a unit in 2, 3, and 4″ lines and in a by-pass line around an orifice on larger lines), read it when you please, it's "the easy way of measuring steam."

Bulletin 234 tells the whole story. You will be interested. May we send it?

BUILDERS IRON FOUNDRY

"Builders of the Venturi Meter for 36 years"

11 Codding Street **Providence, R. I.**

Easily take up the movement of welded underground mains—

BADGER Welding Self-Equalizing Expansion Joints insure the maximum flexibility in welded underground or overhead mains without introducing a single flanged or sliding joint into the lines.

The continuous, deeply corrugated expansion elements—uniform in thickness throughout the corrugations—and surrounded by external machined equalizing rings, freely respond to the elongation and contraction of the pipe lines and protect them from injurious stresses.

Standard guide bearings for bedding in concrete piers are furnished to maintain proper pipe alignment.

Badger Welding Self-Equalizing Expansion Joints are easy to install by welding them right into the pipe line. Since there are no stuffing boxes to pack no maintenance whatever is required.

Guaranteed to 200-lb. working pressure.

E. B. BADGER & SONS CO.

75 Pitts Street, BOSTON, MASS.

New York. 271 Madison Ave. Tulsa, Okla.: Mid-Continent Bldg.

Representatives in all principal cities

BADGER Engineering Service Badger engineers are designers, manufacturers and installation experts for the following and kindred power plant products:—Pipe Bends, Chemical Apparatus, Copper and Sheet Metal Work and Copper Boilers.

BADGER EXPANSION JOINTS

ESTABLISHED 1841 · WEATHER VANE ON FANEUIL HALL · E.B. BADGER & SONS COMPANY · TRADE MARK

Only Ric-wiL Gives You These 7 Underground Conduit Advantages

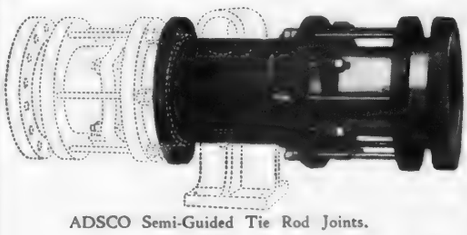
1. A Base Drain that guarantees safe, adequate, immediate drainage, that costs less installed than round drain.
2. A conduit with Loc-liP Side Joints which absolutely seal the split sides and lock top and bottom halves together. Easily inspected. Watertight.
3. Pipe supports that carry pipes independent of the conduit and that are quick and easy to install.
4. Four types of insulation, including Ric-wiL Dry-paC Waterproof Filler, to meet every condition.
5. Cast Iron Ric-wiL for extra heavy duty to eliminate special reinforced concrete construction.
6. A compact, interlocking construction throughout, that assures permanent dry efficiency.
7. Such savings of labor, trenching and extra materials that Ric-wiL costs no more, and often less, than ordinary or field built conduits.

Summer Construction for Winter Needs

SUMMER weather—always favorable for all types of construction, is doubly so for installing underground conduit lines. Contractors' profits are greater in summer, particularly where lots of excavation is necessary. Men interested in underground construction are interested in conduit that is practical in design, effective in operation, easy to install and profitable to them as well as satisfactory to the user.

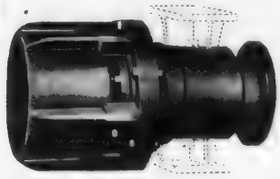
Ric-wiL conduit meets these requirements with the Loc-liP side joint and Ric-wiL base drain foundation that never allows moisture to enter. While Dry-paC, the remarkable waterproof insulation makes damage from line leaks impossible. Too—installation of Ric-wiL systems is simple — requires merely semi-skilled labor and can be laid quickly in close quarters at often less than complicated reinforced concrete box types.

The Ric-wiL Company, 1566 Union Trust Bldg., Cleveland, Ohio

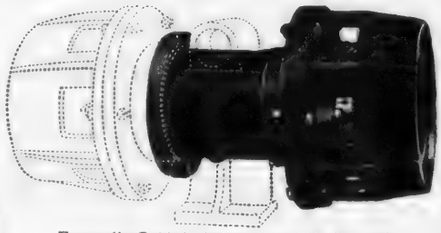


ADSCO Semi-Guided Tie Rod Joints.

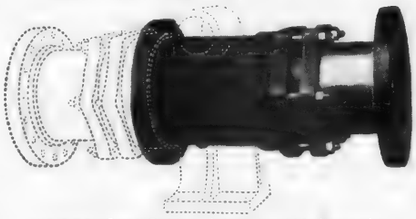
The dotted lines illustrate some of the combinations of ADSCO Expansion Joints



ADSCO Duplex-Sleeve Guided (Air-Cooled Slip) Joints for pressures up to 500 lbs. and temperatures to 750 degrees F.



Externally-Guided designs for 125 lb. and 250 lb. lines.



ADSCO Semi-Guided Joints in 125 lb. and 250 lb. designs.

ADSCO B1, all brass screwed end joint. Furnished internally-guided (R1) for risers.

"Here's that letter from ADSCO! They say, *'We can furnish the joint you have in mind, but do not recommend it as the best type and combination for your use.*

But —

We Have an ADSCO Joint That Exactly Fits the Job!'

"THAT'S one of the advantages of using ADSCO Expansion Joints. We don't have to take an ordinary joint and then spend money on labor and fittings to adapt it to our use, only to have a make-shift job when we get through.

"An ADSCO Joint exactly fits the job, regardless of whether it is for high or low pressure, steam, water, oil, any liquid or gas, and there is no after-trouble or expense because you have an A-1 installation."

* * * * *

You, too, can save time and money by selecting the correct type of Expansion Joint for every service requirement.

Send for our 32-page book, "Reference Data on Expansion in Pipe Lines and the application of ADSCO Expansion Devices." It presents the complete line of ADSCO Expansion Joints designed to meet every operating condition, including such highly specialized joints as the ADSCO DUPLEX-SLEEVE GUIDED EXPANSION JOINT for high pressure and superheated steam, with air-cooled slip that cools the packing, preventing its deterioration —also ADSCO VARIATORS (Packless Expansion Joints) for pressure up to 125 lbs.

It describes and illustrates such cost-cutting combinations as anchors, double and single joints, service and drip outlets. Supplies a quick and convenient method for engineers and users of expansion devices to compute the amount of expansion due to varying temperature. Contains condensed tables, dimensions and typical installations of ADSCO joints.

Write for it today and forget your pipe expansion problems.

AMERICAN DISTRICT STEAM COMPANY
GENERAL OFFICES AND WORKS
NORTH TONAWANDA, N.Y.

Get this book and you will always be able to solve your pipe expansion problems.

To be sure of getting

ADSCO

EXPANSION JOINTS

Order Direct

AMERICAN DISTRICT STEAM COMPANY
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Gentlemen:

Kindly send me your new book, "Reference Data on Expansion in Pipe Lines."

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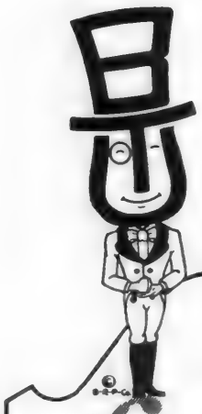
Company .....

Street..... City.....

H-1

BANROC INSULATION WELCOMES HARD BOILED COMPARISON



Facts

Base your judgement of value on facts and your decision will surely be Banroc—These facts tell the Banroc story.

HIGHEST EFFICIENCY

BANROC Insulation at a density of 12.5 pounds per cubic foot, has a thermal conductivity of .275 B. T. U. per square foot, per inch thick, per degree difference in temperature, in one hour (U. S. Bureau of Standards), the lowest of any commercial insulation.

100% FIREPROOF

BANROC Heat Insulation will not burn. It will efficiently insulate at all temperatures up to 1200° F. (BANROC Cements up to 1800° F.)

PERMANENT

BANROC Heat Insulation is permanent. It will not disintegrate or deteriorate — a fact established over a period of more than thirty years of service.

EASY TO APPLY

BANROC Heat Insulation can be easily and quickly applied, saving on installation cost. Tests on various types of construction have proved this fact.

ECONOMICAL

BANROC Heat Insulation is economical — in cost of material, application cost, in the heat it saves, and in its length of life.

"Hard Boiled" comparisons, the kind that get down to facts, are always welcome to Banroc Heat Insulation, for invariably--the facts favor Banroc.

Take it point for point--Banroc will stand any fair comparison with any type of insulation intended for the same purpose.

Compare its efficiency with that of any other type of insulation. The U. S. Bureau of Standards places it next to the silver coated vacuum--giving it the highest efficiency rating of any commercial insulation.

It is fireproof--permanent--easy to apply--flexible--adaptable to all types of equipment--economical. In most cases, even the first cost of Banroc is decidedly in its favor--in all cases, it represents the greatest dollar for dollar value.

But don't take our word for it. Banroc asks no favors--its claims are based on facts--facts that can be substantiated--facts that have been proved over thirty years of service. By all means--get aquainted with the facts of Banroc Insulation.

BANNER ROCK PRODUCTS COMPANY

ALEXANDRIA, INDIANA

Originators of Rock Wool Products

BANROC INSULATION

A Hardinge *in the Heating Plant of Each!*

And every one guaranteed by the FACTORY for 10 years – that *means something to heating engineers!*

Above—The H. W. Gossard Co., Chicago.

Side—Piccadilly Theatre, Chicago.

Booth Tarkington Residence, Indianapolis, Ind.

THE Hardinge burner has definitely proved its capability to render a lifetime of service, hence its wide use by recognized Architects and Heating Engineers. Full of meaning is the year-after-year dependable service rendered by the Hardinge. Our 1927 factory and dealer business showed a very satisfactory increase over 1926.

May we help you prosper with us?

Above—Park Shore Hotel, Chicago.

Right—Noyes Residence, Arlington, Mass.

HARDINGE BROTHERS, Inc.

Manufacturers of Precision-Built Machines for 38 years

Factory and General Offices:
4149 RAVENSWOOD AVENUE, CHICAGO, ILL.

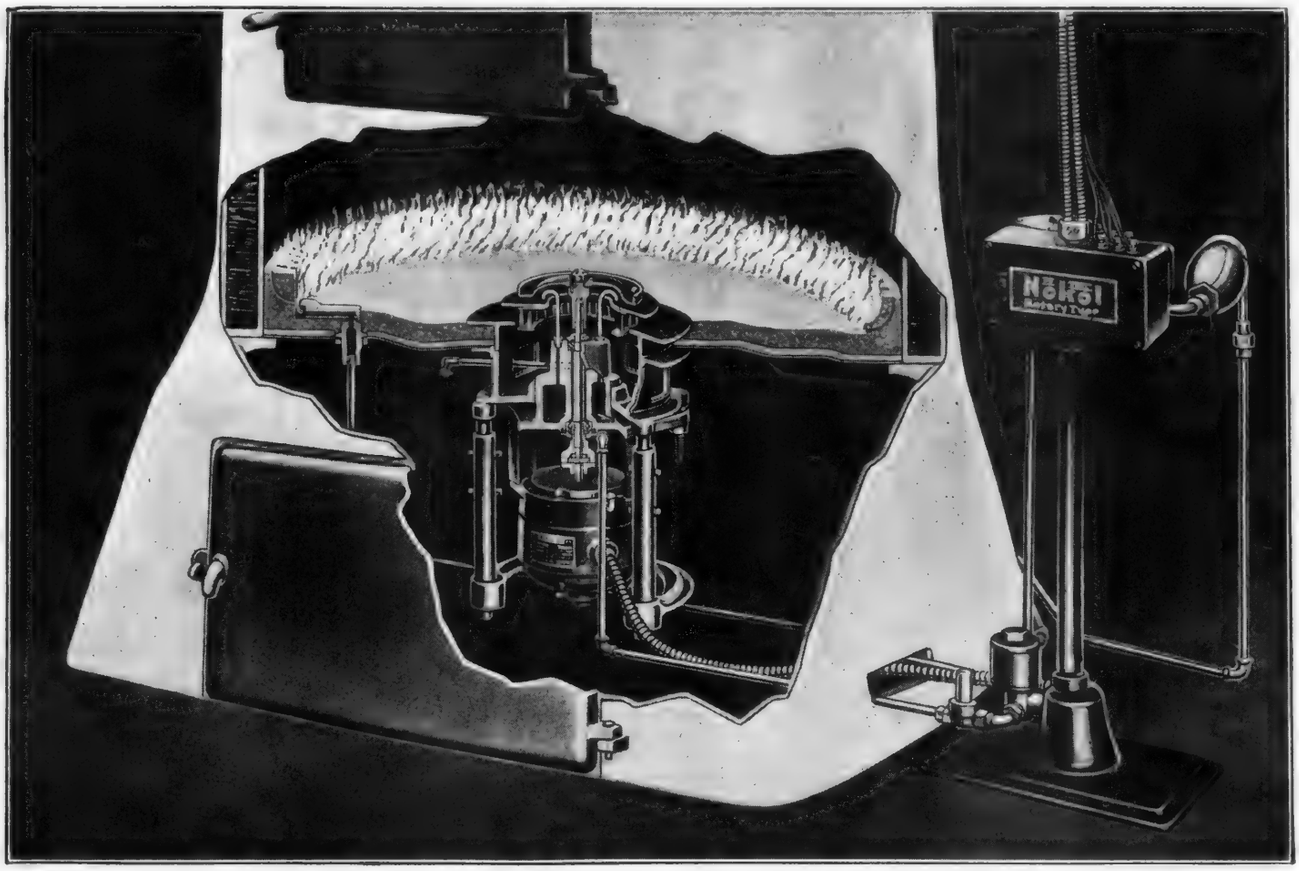
Factory Sales Offices:

CHICAGO
Michigan Ave. at Ohio St.

BOSTON
843 Beacon St.

you can safely have confidence in

HARDINGE FUEL OIL HEAT



IN PUBLIC FAVOR

THE NEW rotary-type Noiseless Nokol has won instant public favor. Created to supply the demand for convenient, dependable automatic oil heat at low cost, this remarkable burner is proving to be just what the home-owner has long awaited.

With Nokol favorably known and nationally accepted for ten years (more than forty thousand Nokol burners now giving heating comfort) it was logical that the world looked to this company to provide the ideal burner at low cost.

Because of this very confidence in Nokol, and the immediate acceptance of the new rotary-type burner, Dealers are today developing a most excellent volume of business. Distinctive advertising and efficient merchandising assistance from the factory support their efforts—make their profits sure.

Our 1928 sales plan offers new opportunities for Dealers. Write today for details!

AMERICAN NOKOL CORPORATION

4217 SCHUBERT AVENUE, CHICAGO

World's Oldest and Soundest Automatic Oil Burner Maker

NEW Noiseless NO COAL Nokol

REG. U.S. PAT. OFF.

CLEAN AUTOMATIC OIL HEAT

Meet the . . .

NEW

Heat King

(A ROTARY OIL BURNER)

Brother of the famous ABC. Made by the foremost manufacturers of rotary Oil Burners.

$295

completely installed with 275 gallon basement tank

NO EXTRAS

WRITE OR WIRE

Automatic Burner Corporation

312 North May Street, Chicago, U. S. A.

PETRO

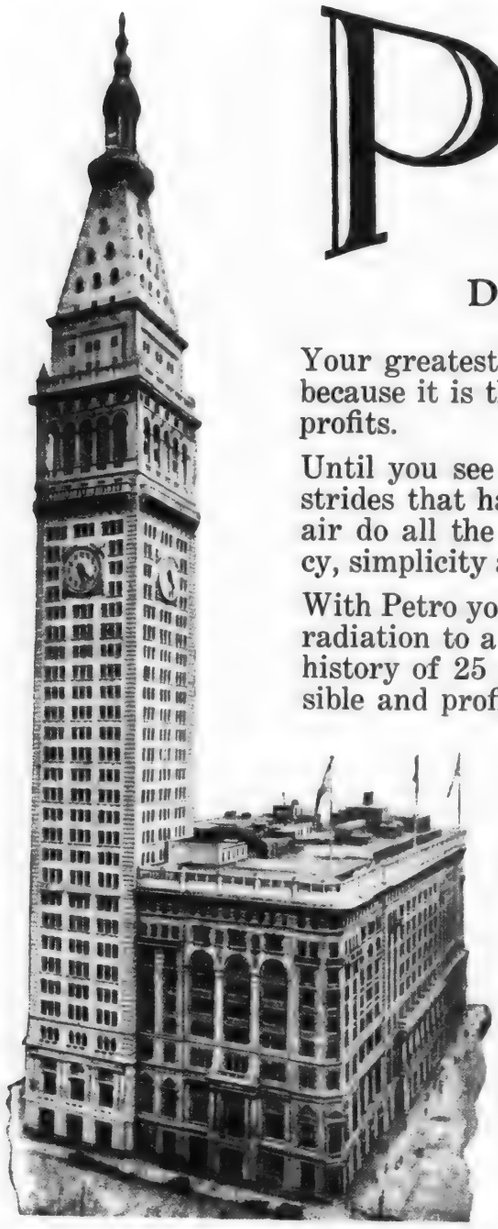
REG. U.S. PAT. OFF

Domestic and Industrial Oil Burners

Your greatest opportunity is with Petro. Not because it is new, but because it is the first to offer you a real solution to volume sales and profits.

Until you see a Petro you can have no conception of the amazing strides that have been made in oil heating. The results of making air do all the work have completely upset all old theories of efficiency, simplicity and economy.

With Petro you can meet every heating need from 200 sq. ft. of steam radiation to a 1000 h.p. boiler. Behind this complete line there is a history of 25 years success. It is the first oil burner to make it possible and profitable for you to *guarantee absolute satisfaction!*



PETRO OIL HEAT 50 STORIES HIGH!

The great Metropolitan Life Insurance Building, New York City, like hundreds of other skyscrapers, is heated by Petro. There is a model for every building from this size down to a 4 room dwelling.

Unlimited Sales Cooperation!

Petro offers the kind of cooperation you want and need. National magazine advertising, local newspaper advertising in your own city, direct mail folders, personal assistance of a trained merchandiser, engineering counsel, are but a few of the efforts made by Petro to help you.

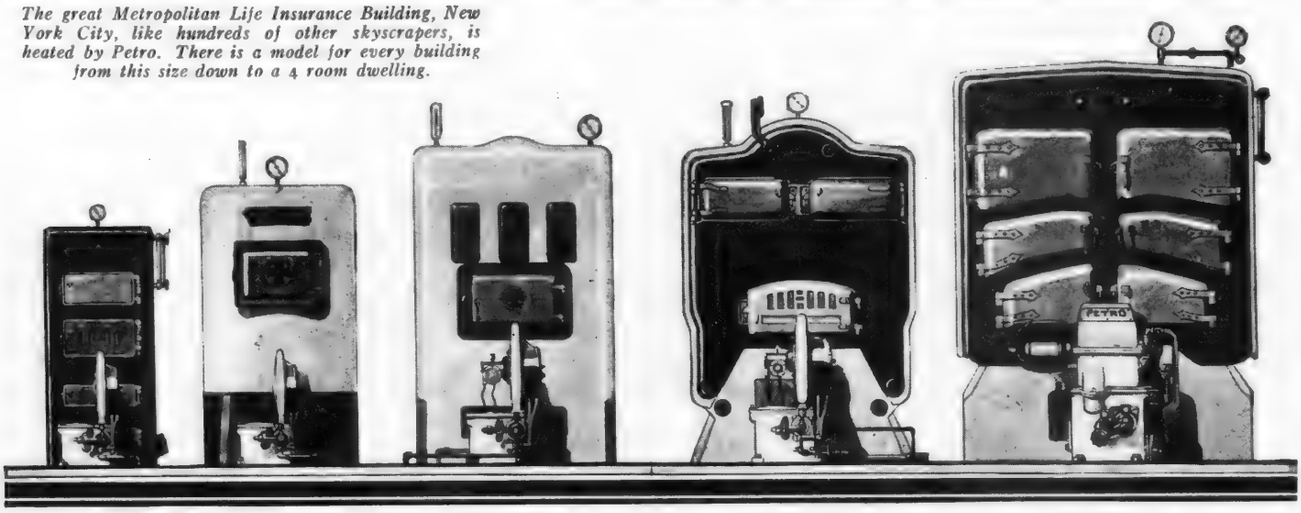
Write today that you are interested in a distributor or dealer franchise and you will be advised how an actual demonstration may be arranged.

PETROLEUM HEAT & POWER COMPANY

Makers of oil burners since 1903

511 5th Ave. New York City

FESS SYSTEM CO. (Subsidiary) 220 Natoma St., San Francisco, Calif.

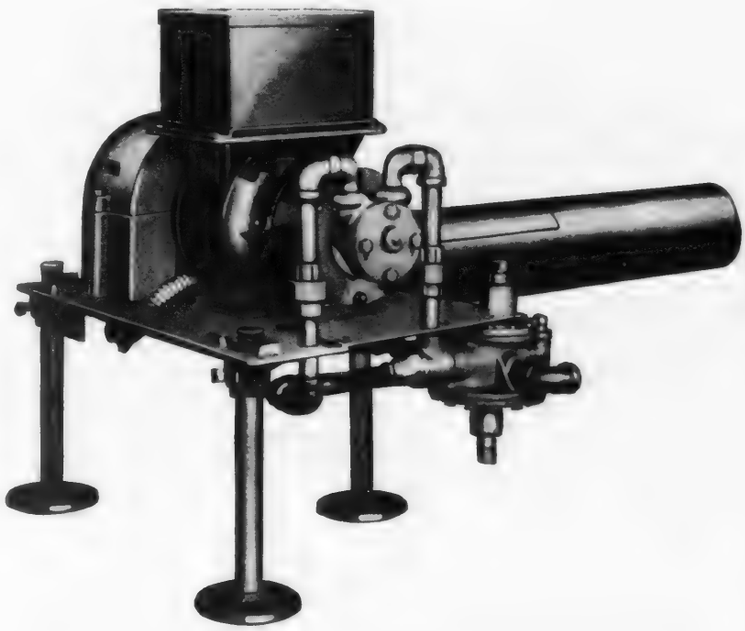


LD-0 Petro
200 sq. ft. st. rad. to 1000 sq. ft. 1 gal. to 2½ gal. per hr. ⅛ h. p. motor

LD-1 Petro
800 sq. ft. st. rad. to 2000 sq. ft. 2 gal. to 5 gal. per hour 1-6 h. p. motor

LD-2 Petro
1800 sq. ft. st. rad. to 4000 sq. ft. 5 gal. to 10 gal. per hour ¼ h. p. motor

LD-3 Petro
4000 sq. ft. st. rad. to 18,000 sq. ft. 10 gal. to 42 gal. per hour. 1 h. p. motor



AUTOMATIC OIL BURNER

Nu-way

FOR HOME HEATING

Automatic Oil Burners for 1928

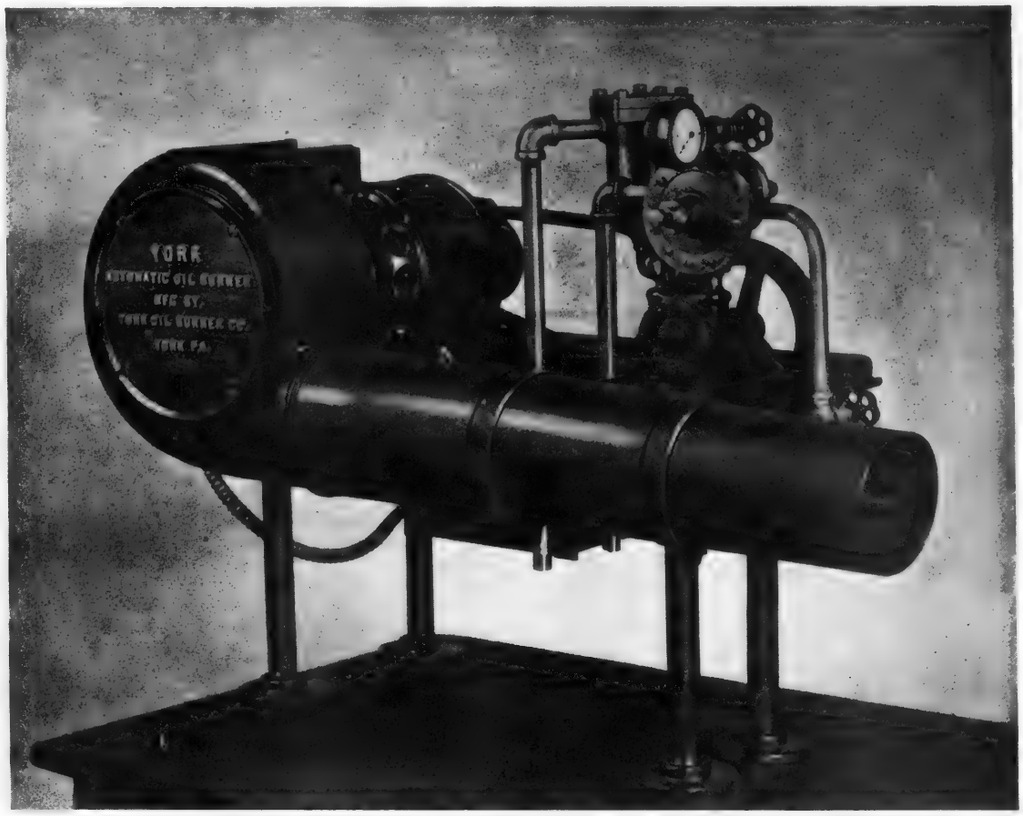
are Equipped with

6 New Sales Features

If your territory is not yet assigned, write for prices and terms

THE NU-WAY CORPORATION

ROCK ISLAND, ILLINOIS



Oil Heating Simplified—

$10,000 per year can be made selling York Automatic oil burners in cities of 50,000 population. A proportionate amount in larger and smaller cities.

Following are facts about York Automatic:

158 sold in York in last year and a half.

An average of a burner a day being sold this season.

98% of installations have cost less than coal to operate.

Service record shows one service call per year per machine.

All-electric ignition. Extremely quiet operation.

We early recognized the fact that it was folly to sell any but the highest grade burner that can be produced. Yet we knew that if this burner could be sold at a price anyone could afford, it would be almost without competition in the burner field. After nine years of building oil burners we have so cut production and selling costs that, in our 1928 model York Automatics we are offering a burner of proven quality at a price to the trade of little more than half that for which similar burners are being sold.

May we give you more detailed information and quote prices?

Specifications

Century Repulsion-Induction motor.

Webster electric transformer.

Tuthill Pump.

Absolute Contactor controls.

York nozzle, York blower and fan, York strainers, York diaphragm pressure-regulating valves. All other parts York built. Extra-heavy brass used in pipe, fittings, strainers, valves, nozzle, etc. Finished with two coats of Duco, red and green and all brass highly finished and polished. Supplied with asbestos lined sheet-metal cover.

YORK OIL BURNER COMPANY

21 West Clark Avenue, YORK, PA.

You Know Electrol's Reputation

NOW LEARN ABOUT

the Most Successful Dealer Sales Plan in the Industry

Electrol has a remarkable local sales plan that enables Electrol dealers to get more prospects, close more sales, cut down selling costs and make more money.

This plan is based on long and intensive investigation and research made in many sections of the country. It is built to provide oil burner dealers with the selling power they need.

The plan has been eagerly . . . enthusiastically accepted by Electrol dealers. If you have been wondering what you could do to build your business, let us tell you about this plan.

You know Electrol's reputation for dependable performance, made possible by correct principles and fine construction. . . .

. . . Now learn about the most successful dealer sales plan in the industry. It is a big step ahead of anything you've heard of in oil burner selling. As sound as the silver dollars that roll in . . . as larger profits. Write today.

Electrol is Quiet . . . Economical in operation . . . All Electric . . . Entirely Automatic. It employs the proved principles of Mechanical Fuel Atomization and positive automatic Electric ignition.

— And watching every operation of the burner The Master Control stands guard like a living sentinel, always at the furnace door.

ELECTROL INC., of MISSOURI
177 Dorcas St., St. Louis, U. S. A.

ELECTROL

The OIL BURNER with *The Master Control*

LISTED AS STANDARD BY THE UNDERWRITERS' LABORATORIES, AND BEARS THEIR LABEL

Performance that sets new standards of Service

In the Webster Ignition Transformer you will find features not employed in any other similar product . . . . . These outstanding electrical developments, exclusively Webster, have reduced oil burner ignition to a point of unusually dependable service . . . . During 1928, many thousands of oil burners, manufactured by the industry's leaders, will be equipped with the Webster Ignition Transformer . . . . . Yours should be among them . . . . . Dependable ignition service will then be assured you . . . . Inquire about the Webster engineering service — it is gratis, and will reveal the five outstanding Webster features to you.

WEBSTER ELECTRIC COMPANY, Racine, Wisconsin
"Specialists in Oil Burner Ignition"

Webster W Ignition Transformer

The Webster Ignition Transformer can be furnished with either single or double high tension terminals, in a variety of voltages and frequencies.

Yours the Credit . . . —*Yours* the Responsibility

THE rapidity with which dependable oil heating is being adopted is one of the outstanding developments in modern living.

Clean, wholesome, uniform oil heat is the one form of heating that will keep a home snug and warm, not only in zero weather, but during those changeable days of spring and fall which offer the greatest heating problems of the year.

Self-regulated—as *effortless* as an electric clock—oil heat eliminates the drudgery of the coal pile and substitutes a clean basement, with extra space, and greater cleanliness throughout the house.

Your customers, in ever-increasing numbers, are demanding this modern form of heating. The only question in their minds is *the kind of oil heating equipment best suited to their needs.*

Safeguarding Your Business

To you will go the credit for the success of the oil heating equipment you install. On you, as an expert, rests the responsibility for its efficient operation.

No sooner is a reliable oil heating unit put in use than the news of its comfort-giving, labor-saving service spreads through the community. Each satisfied user constantly creates new prospects for you. The oil heating unit you recommend must meet the specifications developed through years of experience by oil heating engineers in order for you to get your full share of the big, practically untouched market.

How the Oil Heating Institute Can Help You

The Oil Heating Institute can be of immeasurable service in helping you. This organization is the clearing house for information about the oil heating industry. It has for its purpose safeguarding the contractor, his customers and the industry itself.

Your assurance that the heating plants manufactured by the members of the Oil Heating Institute will function reliably is found in the standards of efficiency and safety to which all members must subscribe.

The manufacturing members of the Oil Heating Institute want to cooperate with you in every way that will save you time and increase the good will of your customers. They have published a series of booklets on oil heat written by national authorities. They contain complete information, together with illustrations, on approved oil heating appliances. The coupon will bring any of them to you.

This is the Emblem of the
Oil Heating Institute

It is the symbol of satisfactory public service in oil heating.

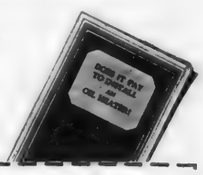
Only the manufacturers who are members of the Oil Heating Institute are permitted to use it.

These manufacturers have earned their membership through the enthusiasm of thousands of home owners whom they have provided with efficient and dependable oil heat.

This emblem protects you, and it will be protected, on your behalf, by the Oil Heating Institute.

Get all the Facts—

Check the book you want



OIL HEATING INSTITUTE
420 MADISON AVE., N. Y. CITY

Please send me, free of charge, the following information on oil heating equipment:

Does it Pay to Install an Oil Heater?.....
Are Oil Heaters Perfected?.....
What About the Supply of Oil Fuel?.....
Making Better Use of the Basement.....
Installing Oil Heat.....

Name.....

Address.....

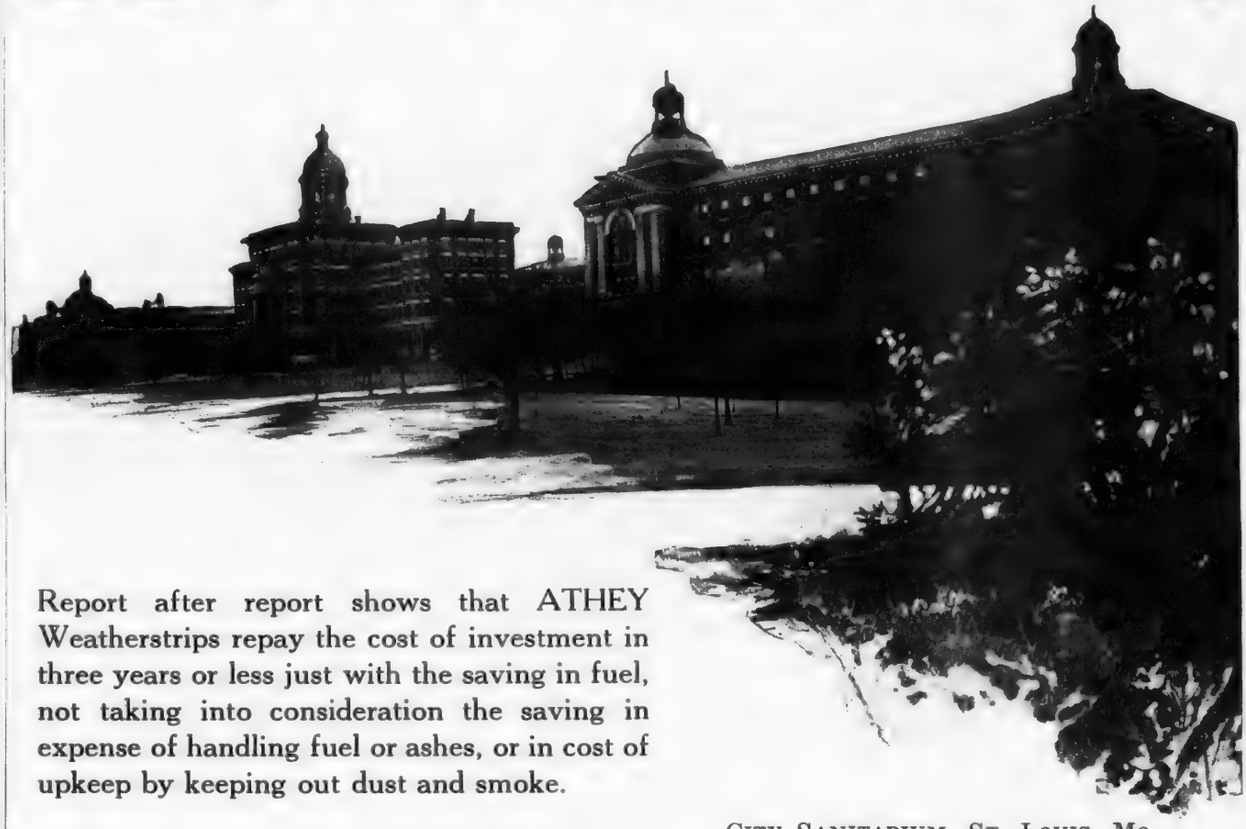
City..... State..... HV 6

OIL HEATING INSTITUTE

420 Madison Avenue New York

The Oil Heating Institute is prepared to furnish special information on the heating of churches, theatres, hotels, apartment houses and office buildings, and on the various heat treating processes of industry.

33% on the investment for the life of the building



Report after report shows that ATHEY Weatherstrips repay the cost of investment in three years or less just with the saving in fuel, not taking into consideration the saving in expense of handling fuel or ashes, or in cost of upkeep by keeping out dust and smoke.

CITY SANITARIUM, ST. LOUIS, MO.
One of the largest weatherstripping contracts ever placed in St. Louis

Now is the time to prepare and plan for fuel saving for next winter.

This cloth insert makes tight contact between metal and window frame.

Athey

CLOTH-LINED METAL WEATHERSTRIPS

change any wood or steel window from a rattling, loose, drafty sash to one that works smoothly and quietly and is absolutely draft-proof when closed. Why force the Heating Plant by trying to heat all outdoors when a simple ATHEY installation quickly pays for itself with the saving in fuel?

Send for this New Athey Book

It contains valuable information for any building owner or manager, architect or engineer desiring to save fuel, prevent drafts and increase comfort.

ATHEY COMPANY

6067 W. 65th Street, Chicago, Illinois

St. Louis Representative: J. C. WASSON CO., Chemical Building, St. Louis, Mo.

Representatives in all Principal Cities and Canada

Rumors notwithstanding!

THE AMERICAN RADIATOR COMPANY is pleased to take this opportunity to pledge itself to keep inviolate the long-established channels for the distribution and installation of our radiator heating products . . . . . We recognize wholesalers as the proper distributors of these products, and the heating contractor as the only authentic medium through which the public shall secure these products and the installation thereof.

Our entire sales-building program is based on these principles.

AMERICAN RADIATOR COMPANY

An Open Letter

Outlining our sales-building program for the entire heating industry, has been mailed to every member of our profession. Copy of this letter is reproduced on the following pages.

© 1928 American Radiator Co.

To the Members of the Heating Fraternity:

NEVER in the history of our industry has there been such a profound need for a clear understanding of our problems and a whole-hearted, united effort on the part of manufacturer, wholesaler, contractor and association toward their solution.

The appeals from competitive industries for the public's buying dollars have reached unprecedented magnitude. Their advertisements are creating desires nation-wide for a host of luxuries and near-luxuries. Their salesmen are ringing door-bells day after day in every town and hamlet throughout the country, showing home owners how easily they can possess these products.

Our Common Problem

Here is a problem deserving the most earnest attention of every member of our industry; and it is a problem to which the American Radiator Company has given very serious study. If the heating industry is to progress and obtain that steadily increasing share of the nation's business it rightfully deserves, it will require, we repeat, the unstinted, wholehearted, enthusiastic cooperation of every member of our profession, working together on a progressive sales and advertising program based on sound facts.

The American Radiator Company has spared no effort to get the basic economic facts about our industry on which to build a logical business-getting program. Through the cooperation of our good friends in the trade, we have secured these facts; and we have formulated a comprehensive and aggressive advertising and sales campaign for the welfare of our industry and its every member—contractor, wholesaler, and manufacturer.

The Facts

What are the facts? What is the real market for the products of our industry? What part of this market are we actually serving, and what is being done to develop it? Let us look at the picture.

A Market Hardly Scratched

There are approximately 1,000,000 homes supplied yearly with heating apparatus of one kind or another. Of these only about 300,000 are being equipped with radiator heating. The balance of 700,000 are being served with old-fashioned types of equipment rarely installed by heating contractors.

Here at once is unfolded a definite market for radiator heat, *more than three times larger than that which we are now serving!*

Replacement Opportunity

Yet, these 1,000,000 homes do not represent our total potential market. There now exist 17,000,000 homes in America which are unequipped with radiator heat. Millions of these home owners are buying automobiles, radios, washing machines, vacuum cleaners, refrigerators, etc.—products which are highly desirable but which, after all, are in the class of luxuries when compared to radiator heating, which protects the very life and health of families. But the manufacturers and distributors of these products have men in the field ringing door-bells day after day, aggressively going after business; and they are getting the business.

Have salesmen been in the field aggressively selling home owners on the advantages of radiator heat through house to house canvassing? No. Efforts in this direction have been haphazard in our industry. We have had no organized plan of action.

A Disinterested, Misinformed Public

And what does the public know of the true

merits of radiator heating? There are no criterions of value respecting types of heating apparatus in the public mind. Vagueness and mystery surround the cost of radiator heating. Largely through the propaganda of those whose interests lie in other types of products, home buyers and home owners possess the notion that radiator heating for an average six or eight room home costs $1,000 and up—a notion automatically precluding even a serious consideration of its purchase.

Do home owners think of easy payments when they think of radiator heat? Do they know they can buy it on easy payments?

Do they know their local Building and Loan Association, Cooperative Bank or other financial organization stands ready and glad to finance radiator installations on the basis of eight or more years to pay?

Building Contractors Unsolicited

Even Building Contractors are but lightly informed on the subject. They, too, feel that radiator heating costs so much more, that to install it adds such an amount to the selling price of their homes as to render them difficult or impossible to sell. No one has been on the job to show these contractors that homes equipped with radiator heat sold many times faster, and that the finest radiator products could be installed in their homes for only $100 to $150 more than the cost of the old-fashioned type of heating plant.

We Need Organized Effort and A Constructive Plan of Action

In short, our industry has not made the progress it should because it had no definite, organized, aggressive plan of action to overcome the difficulties that lie in its path of progress. 700,000 jobs lost to the members of our industry each year. Virtually nothing being done to develop our potential market. Competitive industries obtaining a constantly enlarging share of the public's buying dollars.

Obviously, something has to be done if our industry is to advance.

Answering Our Common Need

And so the American Radiator Company, having thoroughly studied the facts, formulated a plan to overcome the difficulties, in the hope that it might help to build up the industry. We have organized a comprehensive, intensive and aggressive sales and advertising campaign to promote radiator heating consciousness in the public mind, to explain the benefits of radiator heating, to remove the obstacles that stand in the way of its universal adoption, to give home buyers and home owners some idea of the cost of radiator heating, and tell them how easily the money can be obtained for its installation and the convenient terms of payment that may be arranged.

Having the Right Products

The carrying out of this plan comprised, first, the development of heating products having a genuine human appeal. Having originated and introduced the first small tube radiator, we perfected the New Redflash Boiler, which appealed immediately to the sense of pride and ownership of home buyers as no other boiler ever had.

At Popular Prices

We realized that in order to bring radiator heating within popular reach, our products had to be offered at popular prices. At an enormous expense our factories were equipped with the most modern machinery. Every manufacturing economy effected has been passed on to our trade and the public.

Telling the Public—A Million Dollar Advertising Campaign

We laid out a million dollar advertising campaign to spread the doctrine of radiator heat among the people, to explain that only a good radiator heating plant can be guaranteed to produce 70 degrees clean and healthful warmth in every room all winter long, regardless of weather conditions; to point out that it adds from two to three times its initial cost to the selling value of the home and protects the health and comfort of the family during a lifetime.

Taking the "Mystery" Out of Price

Because of the public's false impression that to install radiator heating in the average six or eight room house costs from $1,000 up,

instead of approximately $400 to $600—an impression which absolutely has to be corrected as an indispensable step if radiator heating is to come into its own—we offer in our advertising a basis by which the home owner may quickly and easily figure the approximate cost of radiator heat: $55 to $65 per room.

By thus taking the "mystery" out of the cost and correcting the false impression that now exists, we shall create a widespread, popular demand for radiator heating and multiply our sales. This means hundreds of thousands of *additional* dollars for the members of our profession.

Perhaps in certain communities $55 to $65 may be somewhat low. But even assuming the price runs as high as $85 per room (which it rarely does in the 700,000 small homes which we are trying to reach) because the prospect prefers to have water heating instead of steam, or because of the unusual construction of his house. It is the price appeal that awakens the prospect's interest and brings him to the heating contractor for detailed estimate. The special considerations surrounding his installation can be easily explained; and even though the price to him runs to $85 per room, it is so much lower than what he now thinks he would have to pay, that he is only too glad to buy the radiator plant at the price.

Financing the Home Owner

Then comes the problem of telling the public how they can secure the necessary money to finance the installation of this equipment. And here again our Company is showing the way. We studied the matter carefully with the Building and Loan Associations of America, with Banks, Mortgage and Insurance Companies. And because these progressive institutions understand the advantages of radiator heating in upholding and increasing the value of property and protecting the health, comfort and household budget of the owner, they gladly finance the installation of radiator equipment over a period of eight or more years; and not alone in new homes but *in old homes as well.*

Through our million dollar advertising campaign and the activities of our salesmen in the field, we are bringing this great news to the home buyers and home owners of America.

Organizing Industrial Committees

And beyond all this, Building and Loan Associations are today organizing industrial committees whose object is to tell the people in their communities that they can enjoy the comfort and economy of radiator heating while they are paying for their equipment, at the rate of a few cents a day!

Selling the Way the People Like to Buy

In this connection we realize that many home owners prefer to pay for their equipment on a shorter time basis. To meet the requirements of this class we organized the Heating and Plumbing Finance Corporation. This organization finances the installation of our radiator heating products on time payments with as long as three years to pay. Heating Contractors using this plan get their full cash payment immediately upon completion of a job. The Finance Corporation attends to the details of collection from the owner. The whole purpose behind the organization of the Heating and Plumbing Finance Corporation is to increase sales for Heating Contractors—not to make profit on its financing operations.

Complete Territorial Coverage

The carrying out of our intensive sales building campaign requires a large sales organization composed of men of high sales ability, enthusiasm, and untiring energy, each man working in a territory that he can adequately and completely cover, calling regularly and frequently on heating contractors, wholesalers and architects, but besides, making business-getting calls on home owners, building contractors, Building and Loan Associations, Cooperative Banks and other financial organizations.

Our sales territories were laid out and our sales force greatly increased to meet these new demands.

As a result, our men in the field are securing hundreds of radiator installations that otherwise would never have been uncovered. Their accomplishments to date have been truly amazing and the intensive missionary work they are now doing will bring greater and greater results during the years to come.

And what do these men do with the business they develop? It is turned right over to our heating contractors and wholesalers.

House-to-House Canvassing—The Vecto Store

To supplement the work of our territorial salesmen, we established our Vecto Stores. And let us take this opportunity to explain the purpose of the Vecto store and the responsibilities of the store representative.

The Vecto Dealer a Special Heating Salesman

The Vecto store representative is an independent character of sound financial standing in his community. He is a trained, able salesman, particularly versed in the art of house-to-house selling. He makes no attempt to call on new home-buyers or on building contractors, but confines his efforts to the canvassing of old homes. His store represents a sub-showroom for the display of all the products of our Company.

Taking Heating Census

He goes out and rings door-bells, making a house-to-house canvass each day, taking a census of the heating equipment in each home and shop in the territory. He records the type of heating plant installed in each home, whether it be a stove, hot air furnace or radiator plant; and he finds out when it was installed. He secures the same kind of information on hot water supply equipment.

Selling Radiator Heating First

To each of these homes he brings a message on Heating. When a house is equipped with a furnace, his first duty is to try to sell radiator heat; and even when a house is equipped with a stove he tries first to sell radiator heat. If that is out of the question, he sells the Vecto Heater which—he explains—is not the equal of radiator heat but is the next best to it that has been attained without the use of radiators. He sells the Vecto at regular advertised prices, just as may any merchant in the community.

To homes equipped with radiator heat, but having a very old boiler in the cellar, he tries to sell a new Redflash Boiler.

A Messenger for Better Heating

The important fact is that he is out ringing door-bells, calling on homes already built, and talking Better Heat to every home owner. He pushes Radiator Heat first, and sells a Vecto only when he cannot sell the other. And all of the radiator business that he develops we turn right over to legitimate members of our trade.

Creating New, Additional Business for Contractors

Here is one of the greatest assets our trade and industry have ever had. Thousands of *additional* radiator heating prospects—all representing *new* business—will be secured through the efforts of these special salesmen; and all of this business will continue to go to our friends and patrons in the trade.

It is only fair that these men be compensated for this extra radiator heating business that they develop, and a mutually suitable and equitable compensation should be accorded them by heating contractors.

Selling Domestic Water Heaters

One of the most important functions of these special salesmen is to push the sale of our Ideal Water Heaters.

Some three million water heaters are sold in this country every year. Of these only about 10% are automatic storage heaters. Yet the automatic storage heater is far more desirable from the home owners' viewpoint and offers a considerably larger margin of profit to merchants.

The difficulty in the way of increased sales of automatic storage heaters is, again, lack of knowledge on the part of home owners both in respect to the advantages of this type of heater and its approximate price.

The special salesmen working from the Vecto Stores break down this difficulty by spreading the true facts about these heaters. And all this means a higher standard of comfort and sanitation in American homes and more business and greater earnings for our customers. For just as in the case of radiator business, every order that these salesmen develop on Ideal Water Heaters represents *plus* business, because they solicit old homes only. It all goes to members of the trade; and here again a fair compensation should be accorded these salesmen by contractors.

Heating Contractor's Greatest Asset

This is the whole story of the so-called Vecto Dealer. He is really a special heating, house-to-house salesman. He is not in competition with the trade; he is one of their strongest assets. He is making every home owner in his territory think of *better heating*. He is performing a highly important role in the program for making the home owners of America radiator-heating conscious. His efforts should be welcomed—as they are by all those who understand his true purpose—and his services should be absorbed and utilized, as we know they will, by all forward-looking contractors.

Business-getting Service for Our Trade

Finally, we realize the obligation to our trade that accompanies such a broad and intensive sales-building and advertising campaign. At an enormous expense we have extended our warehouse facilities throughout the country to render quick, efficient, reliable distribution of our products to our customers, so they, in turn, can render the same kind of business-getting service to their clients.

And we have developed and placed at the disposal of our patrons the most complete, attractive and effective means that any contractor in our industry has ever had offered to him for tying up locally with our million dollar national advertising campaign.

All for the Upbuilding of Our Industry

This is our policy and program of progress. Could there be anything narrow or destructive in such a program which was conceived from the very beginning in a spirit of helpfulness for the industry we love so well? It is aggressive, but it must be so to meet the new marketing conditions evolved by other industries which, in the aggregate, are taking too large a share of the greater buying power of the public. It is comprehensive because it has had our profound and earnest study. Its execution has represented an enormous outlay of money but the thought of that never deterred us for a second. Leadership had to be assumed by those with the will and experience and resources to carry out a program of progress for our whole industry.

Cooperate!

The heights to which we can build are unlimited. But we must build according to a plan and with the utmost faith, confidence and cooperation on every side.

We shall continue to refine and improve our equipment and bring out new products to meet the new demands as they arise. We shall continue to offer our products at fair and popular prices and maintain always a vigorous, enthusiastic sales-building program in their behalf and for the betterment of our industry as a whole.

With mutual faith and confidence on the part of every member of our profession—contractor, wholesaler, and manufacturer—each giving his enthusiastic, whole-hearted support to the same ideal and the same program of progress, our industry will advance into a new era of service and increased prosperity. But without this union of thought and action, without faith and confidence on every side, our industry will not rise to the level of its great opportunity.

Faithfully yours,

President

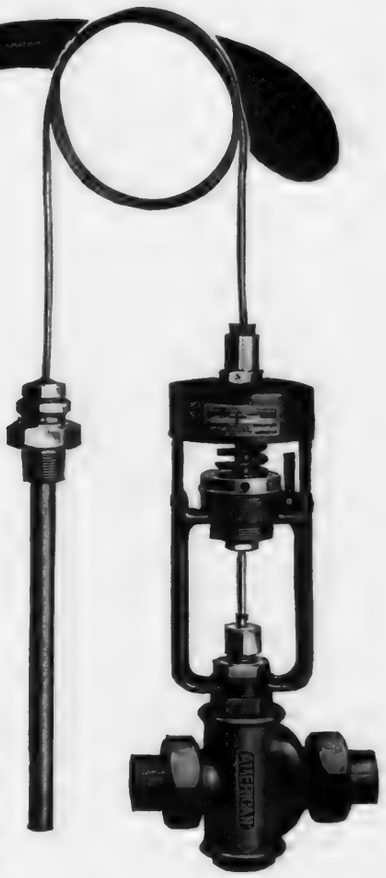
May 21, 1928.

AMERICAN RADIATOR COMPANY

40 West 40th Street, New York City

New

Big Saver of Money, Time and Labor

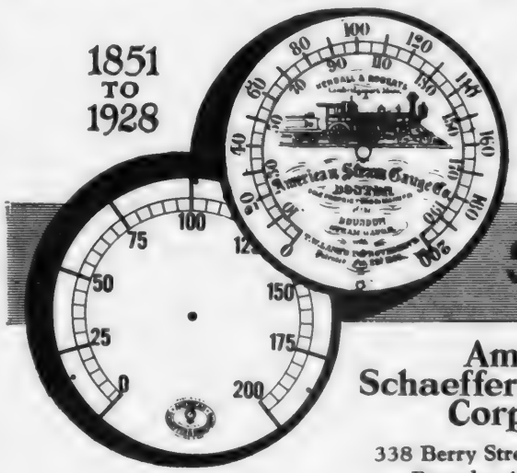


Here is the New American Precision Temperature Controller for very closely controlling critical temperatures. With favorable conditions, regulation within 1° F. can be maintained consistently.

No attention needed. Simple to install. Self-operated. Positive in action. Rugged in construction. Low in cost.

The New American Precision Controller is a good investment. If you doubt it, try one. You will not be expected to keep it unless you are completely satisfied.

Mail the coupon today for description and prices.



AMERICAN INSTRUMENTS

SINCE 1851

American Schaeffer & Budenberg Corporation

338 Berry Street, Brooklyn, N. Y.

Branches in principal cities

American Schaeffer & Budenberg Corp.,
338 Berry St.,
Brooklyn, N. Y.

Please send me your folder R-14 on the New American Precision Controller

For .....

Name .....

Company .....

Street .....

City ..... State .....

Mercoid Risertherm

For High or Low Voltage

Another outstanding Mercoid control! The Risertherm, which is clamped on the risers of hot water heating systems, or on the surfaces of hot water tanks or pipes, closely regulates the temperature within. This control is simple to install and easily adjusted.

The Mercoid Risertherm fits any pipe or hot water tank, and may be installed vertically, as shown in this photograph, or horizontally. The cut-in and cut-out points are not affected by change of position.

The clamping feature of the Risertherm is adjustable to any size pipe and it may be applied to the surface of large diameter tanks by the use of extra length strips. When the clamp is tightened, it is practically impossible to move the instrument around on the pipe.

For Dual Control of Unit Heaters

When clamped on the riser of unit heater equipment for thermostatic control, the Risertherm can be supplied to open the circuit when the temperature in the coils drops to a predetermined point, insuring economical operation.

Write for Bulletin

THE MERCOID CORPORATION

564 West Adams St.
Chicago, Ill.

25 Church St.
New York, N. Y.

A wonderful record of growth

NEWPORT
MAGAZINE FEED
BOILERS

and "all set" to keep growing

GO WITH *NEWPORT* TO BIGGER PROFITS

Rise above competition. Stop putting in bids with too little leeway for profit on boilers that have no special features. Bid on Newports—present the exclusive Newport features that clinch sales: lower cost of fuel and convenience made possible by magazine feeding principle.

Let us tell you how to take advantage of public acceptance of Newport superiority and economy. How to put in bids that result in contracts at a good profit. We'll also send you our valuable *free* book "The Practice of Scientific Heating."

NEWPORT BOILER COMPANY
(Division of Hart-Parr Company)
GENERAL OFFICES
529 South Franklin Street -:- Chicago, Illinois
Distributors in all principal cities of the United States and Canada

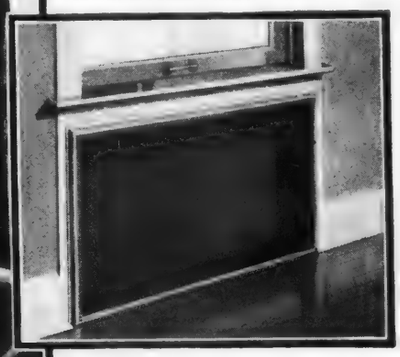
15 Successful Years—Exclusive Patented Features—Unlimited Manufacturing and Distributing Facilities

Another Big

UNDER-WINDOW

The famous Trane copper-fin heating element is now part of a standard three-piece unit, furnished complete, *ready to install* under windows.

The new under-window unit fits into this standard wall space. *No work required of other trades* — carpenters, lathers, plasterers, sheet metal men, etc.



Another big step forward in room heating

Here's what you asked for! A Trane Concealed Heater especially designed for installation under windows. A complete outfit to slip in the wall without fuss, bother, or extras to buy. A concealed heater with the entire front panel removable, so you will have no plastering problems and so you can easily and quickly inspect the heater, trap, or valves if you wish. An outfit with underslung piping connections, which will save you at least a foot in length for a given heater. A heater with universal fittings that are suitable for use on all types of heating systems.

This new Trane Under Window Concealed Heater is what you want. Convected Heat. Instantaneous control. A lower installed cost than we could ever promise before. Simple, quick, handy, convenient, the last word in modern concealed heating.

Thousands of installations of the original Concealed Heaters in the past two years furnish the background for this perfected unit. Here are the details:

Trane Achievement

CONCEALED HEATER

Complete Assembly Furnished: The Trane Under-Window Concealed Heater is a complete unit. Three parts: (1) Wall box acts as a stack — guides flow of heated air from heater out into room. (2) Heating unit — standard Trane design; all copper — no soldered or welded joints. (3) Front panel completely covers opening left in wall; perforated at bottom for cold air inlet, at top for warm air outlet. Choice of several styles.

A One-Man Job: All you need ask of other trades is a hole in the wall, of the correct size. One man does all the rest — even to unloading from the truck, as the entire unit weighs only 1/10 as much as an equivalent cast iron radiator. Neither the carpenter nor the plasterer has any further contact with you.

Lower Cost: The complete Under-Window Concealed Heater, including front panel, actually costs less installed than the standard Concealed Heater.

Space Saved: New underslung pipe connection makes unit approximately 1 ft. shorter for a given heater — a point that appeals strongly to architects.

Ample Capacity: Sizes for all conditions. From 6 to 100 sq. ft. equivalent cast iron radiation — *guaranteed* — available in complete units. Larger capacities available on special orders.

Immediate Access at Any Time: Simply remove the front panel. Trap is underneath the heater — easily reached for hooking up or examining. No difficulty in servicing after unit is once installed.

Method of Installing: (1) Slip wall box into position. (2) Place heater on two lugs in wall box, make two piping connections. (3) Fasten front panel to wall box with screws. And that's all! Nothing could be quicker or simpler.

Control: Two methods, both instantaneous: (1) Shutter type grille installed back of heat outlet, operated by the small knob on the outside of the heating unit. (2) Control valve on the heating unit.

Standard Sizes: Four widths: 4", 6", 8", 12". 4"and 6" units fit standard walls without furring. 8" and 12" units designed for window seats — may be used with higher stacks anywhere in walls, with beautiful panel effect on furring. Lengths and heights for almost any condition — under windows or elsewhere in rooms.

Write at once for additional information on this modern development.

What they say—

"Trane Heat Cabinets entirely satisfactory. Am pleased to recommend them to all who contemplate putting in a modern system of heating."

Rev. Wm. E. O'Hern,
Emporium, Pa.
(Installation in Church and Rectory.)

"Installed one for a customer who is burning oil in a steam plant. Sun room with 90 ft. of 26" radiation never heated properly before. With a 54 ft. Trane Cabinet, the customer tells us this is the warmest room in the house."

Ebling Hardware and Plumbing Co., Inc.,
Kenmore, N. Y.

"Have had no trouble with them whatever in the severe weather, although our house occupies the top of a hill where the wind sweeps continuously.

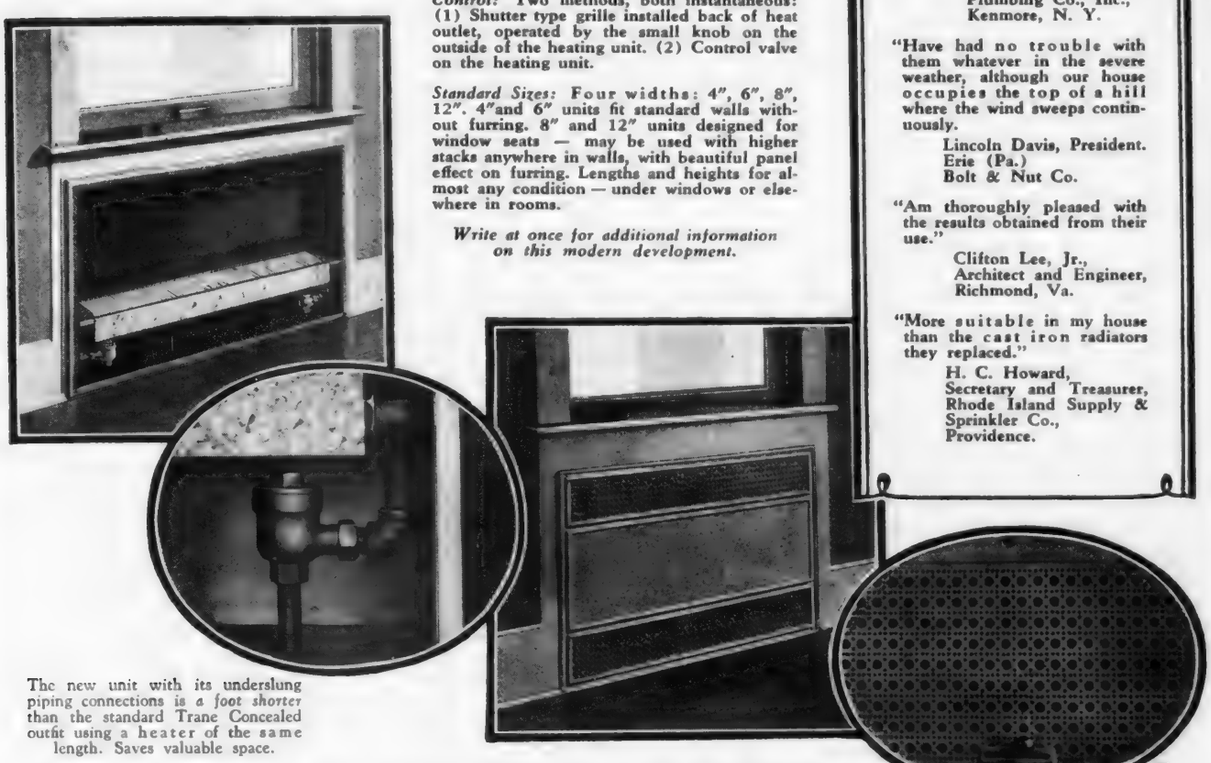
Lincoln Davis, President.
Erie (Pa.)
Bolt & Nut Co.

"Am thoroughly pleased with the results obtained from their use."

Clifton Lee, Jr.,
Architect and Engineer,
Richmond, Va.

"More suitable in my house than the cast iron radiators they replaced."

H. C. Howard,
Secretary and Treasurer,
Rhode Island Supply & Sprinkler Co.,
Providence.



The new unit with its underslung piping connections is *a foot shorter* than the standard Trane Concealed outfit using a heater of the same length. Saves valuable space.

This is the first of three important announcements to be made by Trane during 1928. The next will appear in an early issue of this publication.

THE TRANE CO. (Est. 1885), 206 Cameron Ave., La Crosse, Wis.

HEAT CABINETS **TRANE** CONCEALED HEATERS

PUMPS AND HEATING SPECIALTIES

The front of the unit, including grilles, is a one-piece panel, furnished complete. Slips on and off in a moment — provides *immediate access to the unit at any time.* Note detail of control knob on the damper grille, also rear view of grille showing shutters.

Our Contribution
to the art of Heating & Ventilation

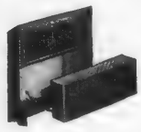
FIVE YEARS AGO when the Herman Nelson light weight, compact, indestructible radiator was placed on the market, it was immediately accepted as the greatest advance in the art of Heating and Ventilation in a generation. It has made possible heating and ventilation dependability and performance hitherto unattainable. The Herman Nelson Wedge Core Radiator is an exclusive feature of all Herman Nelson Heating and Ventilating Products and accounts for their unequaled performance.

HEATING · VENTILATING · COOLING · DRYING · CONDENSING

UNIVENT

for the ventilation of schools, hospitals, offices and other buildings presenting an acute ventilating problem.

HERMAN NELSON *Invisible* RADIATOR

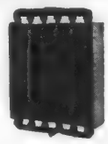


... supersedes all previous radiators, radiator cabinets or enclosures. Occupies no room space and makes possible any desired decorative scheme or furniture arrangement. Indestructible in service.

THE HERMAN NELSON hiJet UNIT HEATER

It operates at steam pressures from 1 to 150 lbs., and offers the better and more economical way of diffusing heat in Factories, Railroad Shops, Roundhouses, Mills, Warehouses, Garages, Gymnasiums and Industrial Buildings.

Herman Nelson Radiator Sections
for Blast Heating and Cooling



Indestructible, operating at any steam pressure from 1 to 150 lbs., non-corrosive and leak-proof.

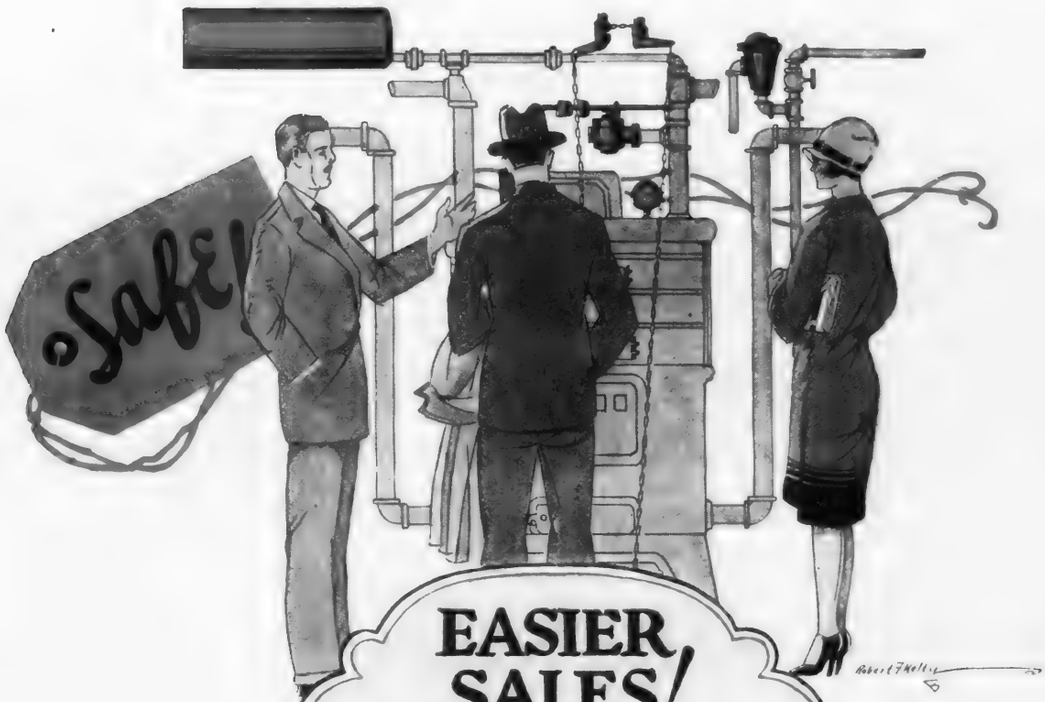
May be arranged in banks to solve any special problem of heating or cooling.

THE HERMAN NELSON CORPORATION · *Moline, Illinois*

Builders of Successful Heating and Ventilating Equipment for over 20 Years

Sales and Service

BELFAST, ME.	BUFFALO	CHARLOTTE, N. C.	CLEVELAND	INDIANAPOLIS	GREEN BAY	ATLANTA	KANSAS CITY	SPOKANE	VANCOUVER
BOSTON	PHILADELPHIA	GRAND RAPIDS	COLUMBUS	CHICAGO	MINNEAPOLIS	MEMPHIS	OMAHA	PORTLAND	TORONTO
NEW YORK CITY	SCRANTON	SAGINAW	CINCINNATI	DES MOINES	ST. LOUIS	DALLAS	DENVER	SEATTLE	WINNIPEG, MAN.
UTICA	PITTSBURGH	DETROIT	TOLEDO	MILWAUKEE	BIRMINGHAM	EMPORIA	SALT LAKE CITY	SAN FRANCISCO	CALGARY, ALTA



EASIER SALES! ..and here is the reason

THERE'S no trick about selling a Hot Water Heating job Thrush Equipped ♛ The added convenience of the Thrush regulation is a definite contribution to home comfort ♛ The safety is positive ♛ Economy of fuel consumption is startling as compared to gravity, hot water, or other forms of heating ♛ The installation cost is lower than for the ordinary expansion tank and reduced pipe sizes completely offset the cost of the Thrush System. ♛

Added Equipment that Costs the Owner Nothing!

It's true! You can offer a Thrush Equipped Hot Water Heating job—*a closed system with higher efficiency, plus automatic regulation*—at no higher cost than your competitor asks for a gravity job without any regulation at all ♛ Isn't that a wonderful selling argument? ♛ Can't you build volume and profit with equipment that costs nothing more than the ordinary equipment which it replaces, yet pays you a greater profit, reduces your installation costs and wonderfully improves operation? ♛

Better Heating that Brings New Friends

Best of all, every Thrush Equipped Hot Water Heating plant that you sell is *a continuous advertisement for your service* ♛ It makes a friend for you and these friends tell their friends and establish new prestige for your business ♛

This isn't theory for thousands of jobbers and dealers everywhere have proved it beyond question of doubt ♛

Thrush Equipment can be put on old or new plants to convert a gravity job into a closed or pressure system with the tank in the basement and automatic regulation of dampers ♛ The compact installation all goes on or near the boiler, requiring only six feet of pipe and seven connections ♛

Ask Your Jobber About It

Thrush System is sold by good jobbers throughout the United States and Canada ♛ Ask your jobber's salesman to tell you about the Thrush plan for helping dealers sell—or mail the coupon below and we will have your jobber tell you about it ♛

THRUSH SYSTEM
OF HOT WATER HEATING

New Homes or Old—

MAIL THIS COUPON!

H. A. THRUSH & CO., Peru Indiana

Gentlemen: Please send me illustrated catalog and other data on Thrush Equipment and tell me about your advertising and selling helps for dealers.

*Name*_____

*Address*_____

*My Jobber is*_____

They're Prospects

Armstrong steam traps

are dependable and economical

THE dependability of Armstrong Traps has been proved by the thousands that are in successful operation in nearly every industry. The unique design provides all the desirable characteristics which a steam trap should have without inflicting any faults.

Armstrong Traps are water sealed against the leakage of steam. They are always full of water. Their operation is positive. The valves are either wide open or tightly closed. This reduces the possibility of clogging and eliminates wire drawing which causes scoring of valves.

The swirling action of the water in passing through the trap stirs up the sediment and scum and carries them out with the condensate. Air which collects above the water in the trap is discharged ahead of the condensate.

Heat treated chrome steel valves and seats keep down wear and prevent leakage. The small size for a given capacity reduces the first cost, and makes installation a simple matter. No foundations, brackets or special fittings are necessary and the completed job is neat in appearance.

Armstrong Traps save you steam, help your equipment to operate more efficiently, and seldom require any attention.

ARMSTRONG MACHINE WORKS

346 Maple Street
THREE RIVERS, MICHIGAN

DISTRICT REPRESENTATIVES IN 36 CITIES

H&V6-GRAY

Accumulators, Water

1 Bulletin 725-A shows how to use Webster Water Accumulators to get closer control of reducing valves.

Air Separating Tanks

2 Bulletin 714-A—Plain, water control, steam control, and Hydro-Pneumatic Tanks for use in Webster Vacuum Heating Systems.

Draft Regulators

3 Bulletin 718-A describes extra-sensitive damper regulator for controlling pressure in Webster Type "R" (vapor) Systems.

Dirt Strainers

4 Bulletin 709 describes dirt strainers and dirt pockets for use in Webster systems of steam heating.

Expansion Joints

5 Bulletin 1100—Webster Expansion Joints.

Governor, Vacuum Pump

6 Bulletin 708—Governor for steam driven vacuum pump in Webster systems.

Hylo Systems

7 Bulletin 710-A—System for equalizing circulation in group of buildings heated by central vacuum system.

Instructions

8a Bulletin S-500B—Instructions for installing and operating Webster Vacuum Systems.

8b Bulletin S-650 — Instructions for installing Webster Type "R" Systems of Steam Heating.

8c "How to Get Best Results from Your Heating System." Non-technical description of Webster Type "R" System to assist owners in operation.

Laundry Traps

9 Bulletin 1200 describes new traps for use on laundry apparatus at 10-100 lbs. per sq. in. with increased output.

Lift Fittings

10 Bulletin 713-A describes Lift Fittings for use in pairs where condensation is lifted in Webster Vacuum Systems. Save pipe-fitting labor.

Process Steam Traps

11 Bulletin 1200 describes new series of thermostatic traps for use on cookers, jacket-kettles, dryers and other process apparatus.

Traps, Drip

12 Bulletin 712 — Combination thermostatic and float trap for ends of mains, etc., in Webster Systems. Light, easy to install and large capacity.

Traps, Heavy Duty

13 Bulletin 706-2A—Series 19T traps for large volumes of condensation.

Traps, Radiator

14a Bulletin 701-A—Webster Sylphon Traps.

14b Bulletin 702-A — Webster Series No. 7 Traps.

Valves, Modulating Radiator

15 Bulletin 707-3A — Webster Type "W" Modulation Valve, provides graduated flow at the radiator in Webster Systems.

Valves, Packless, Radiator

16 Bulletin 705-51A — Webster Sylphon Valves, packless quick-opening for radiator supply in Webster Systems.

Vacuum Heating Systems

17 S-500B—Instructions for installing.

"Vapor" Heating Systems

18a B-600—Catalogue describing Webster Type "R" System.

18b 650—Instruction for installing Webster Type "R" Systems.

Have you a complete data file on Webster Systems of Steam Heating?

WEBSTER BULLETINS play an important role in Webster Service to architects, engineers and heating contractors. These Bulletins cover each type of Webster System and each item of Webster Equipment. With a complete file of these Bulletins at hand, you will find a logical, practical solution to almost every problem of steam heating installation or service.

In the panel at the left, we give a complete list of Webster Bulletins, telling something of the subject or subjects covered in each bulletin. That you may become better acquainted with the entire Webster Line—and that we may be able to serve you better—will you check the numbers corresponding to the bulletin covering subjects not yet familiar to you and of which you have no copy in file?

- since 1888

Webster

Systems of Steam Heating

Warren Webster & Company, Camden, New Jersey

Pioneers of the Vacuum System of Steam Heating

52 U. S. Branch Offices—*In Canada, Darling Bros., Ltd., Montreal*

Warren Webster & Company
Camden, New Jersey

I have read over the list of Bulletins relative to the various phases of Webster Systems of Steam Heating. I have marked (x) in the square opposite the subjects in which I am interested.

☐(1) ☐(2) ☐(3) ☐(4) ☐(5) ☐(6) ☐(7) ☐(8a) ☐(8b) ☐(8c) ☐(9)
☐(10) ☐(11) ☐(12) ☐(13) ☐(14a) ☐(14b) ☐(15) ☐(16) ☐(17) ☐(18a) ☐(18b)

Name.....**Position**.....

Firm.....

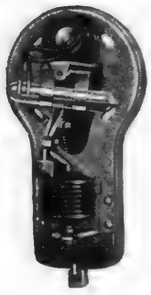
Street.....

City.....

H V M6-28

MERCOID CONTROLS
for *heating* and *ventilating*

THE purpose of this advertisement is to arouse interest in the use of MERCOID Controls for Heating and Ventilating. The applications already developed in this field are too numerous to explain in an advertisement but the short statement herein will give a brief picture of some uses for these rugged accurate controls. Members of the Heating and Ventilating profession can expand their business—profitably—by specifying and using these reliable controls in their work. All MERCOIDS carry the full line current, no corrosion of contacts—no costly service.

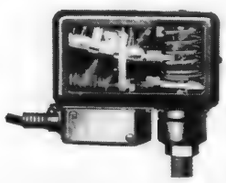


MERCOID Thermostat No. 845—cover removed. For temperature control on oil burning equipment, refrigeration and general industrial work, 110 or 220 V. current A. C. or D. C.

No. 845 Thermostat for Heating Industry

This quick acting, sensitive instrument has a wide variety of applications. Today there are thousands used for room temperature control on Oil Burners and Refrigeration. They also are widely used for Unit Heater control saving steam and current, are easy of installation and assure maintenance of proper temperature for workmen. No. 845 is also used with Buckwheat Blowers and Culm Burners for room temperature control. It can be used in combination with the ARCO Motor Valve to control the supply of city steam for private residences. In apartment houses it can be used to regulate portions of the radiation, as for example on individual risers. The same combination can also be used for the control of temperature in factory offices and workrooms.

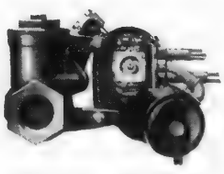
The combination of No. 845 and Motor Valve also has a wide application in blower work to control air temperatures by regulating steam to the tempering heater and main heater. This instrument in combination with the ARCO Motor Control is used to regulate temperature of the air in the blower ducts by operating mixing dampers.



MERCOID No. 848 Model A, for pressure and vacuum. For controlling pressure of steam, air, gas, water, etc. Similar models to control temperature of liquids, air and other gases.

No. 848 MERCOID Control

No. 848—pressure and hot water boiler types—are widely used for boiler control on oil burners and buckwheat blowers. The model "L" with the Motor Valve makes a perfect tank regulator for water heated by steam.



ARCO Motor Valve No. 847. Single seated motor driven valve for steam, water, oil, air, gas, brine for pressure up to 250 lbs. Especially adapted for automatic regulation of temperature pressure or vacuum in combination with MERCOID Controls.

No. 847 ARCO Motor Valve and No. 846 ARCO Motor Control

These two devices can be used with any MERCOID for temperature, pressure or vacuum control. Or they can be used with a hand push button for manual control to regulate the flow of liquids, air and gas, or by using the motor control, to operate dampers, large valves, and do other work.

The controls featured above represent only a portion of the complete line of MERCOID controlling devices. At your request we will send you, without obligation, further information regarding this complete line, including a booklet showing 30 methods of using these famous controls.

AMERICAN RADIATOR COMPANY

ACCESSORIES DIVISION, Dept. "H"

40 West 40th Street New York, N. Y.

Makers of IDEAL Boilers, AMERICAN Radiators, ARCO Tank Heaters, VENTO Ventilating Heaters, AIRID Air Valves, MERCOID Controls and devices for drying, humidifying, cooling and refrigeration.

TWINFAN COPPER RADIATOR

Cross Section Through Header and Tubes

Has Screwed Ground Joints

Another Example of TWINFAN'S Refinement of Design

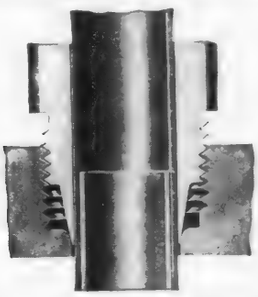
The joints in the TWINFAN Light-Weight Copper Radiator are screwed ground joints.

No Solder — No Welding — No Gaskets

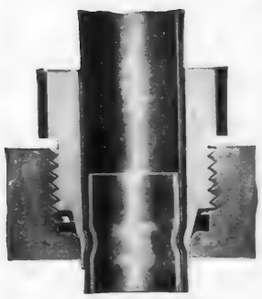
These Joints Can't Loosen

Headers are in *one piece,* eliminating gaskets. All joints on outside of headers. Although the TWINFAN Radiator is of the light-weight type, it is a real steam radiator in every sense of the word.

The many other refinements in the improved TWINFAN Unit Heater are described in our Bulletins Nos. 201 and 202 which will be sent on request.



Before Joint is Formed



After Joint is Formed

A Twinfan Unit Heater suspended from a brick wall

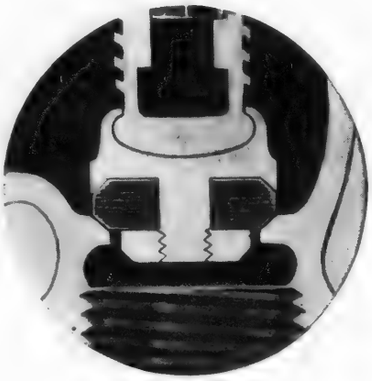
DWYER EQUIPMENT CO.

4534 W. NORTH AVE. CHICAGO, ILL.

HEAT WITH TWINFAN UNIT HEATERS

Marsh Cone Discs are without question the **greatest improvement** in radiator valve construction **in the past fifty years** or since the composition disc replacing the old style metal-to-metal disc and seat; **are original, distinctive and exclusive** with the **Marsh Valve Company,** of Dunkirk, New York, and are offered to the trade **only** and exclusively through its Sales Organization and Distributors.

¾" Full Size



Positive Seal

We call particular attention to the following FIVE POINTS OF ADVANTAGE of this construction over the old style flat disc and seat:

FIRST—Through design of disc and protection afforded from disc nut covering under surface they will not warp and crack as will a flat disc which overhangs valve seat.

SECOND—The compression is at right angles to face of seat, forcing disc compound inward to center, making disc more compact and harder instead of scoring and extruding over seat, opening cracks or seams if any, as with a flat disc.

THIRD—While the life of these cone discs because of construction, as proven by test, is three to five times the life of a flat disc, and a CRACKED DISC IS IMPOSSIBLE, the matter of exchange if desired is very simple, as to remove disc nut the disc will drop from discholder, while with a flat disc it must be dug out, often destroying discholder. Further, these cone discs are reversible and can be turned over or replaced with new at the same cost as for a flat disc.

FOURTH—The beveled seat is low in valve body, giving perfect drainage and will wash free from sand or scale in system, positively providing against leakage through scale or grit imbedding in disc AS IS COMMON with a raised flat seat and flat disc construction.

FIFTH—Through this low beveled seat, to return condensation through valve for a one-pipe system, the flow will hold to the outer wall, leaving center of valve throat and pipe free rather than shoot out over a raised seat to the center of pipe as is common with a heavy flow over a flat seat, clogging flow of steam, causing hammer or pounding of system.

The above are all, each and every one, practical points which will prove out in test and practice.

WE SPECIALIZE on high grade radiator valves, THEREFORE QUALITY; and manufacture and furnish the largest line of any company in the world, THEREFORE QUANTITY AT MINIMUM COST, and—QUALITY and COST—talk.

Get Our Catalog and Prices

MARSH VALVE COMPANY

DUNKIRK **NEW YORK**

General Sale Distributors

Edward T. Hetherington
1709 Sansom St., Philadelphia

Appleton & Liptrott, Inc.
1480 Broadway, New York

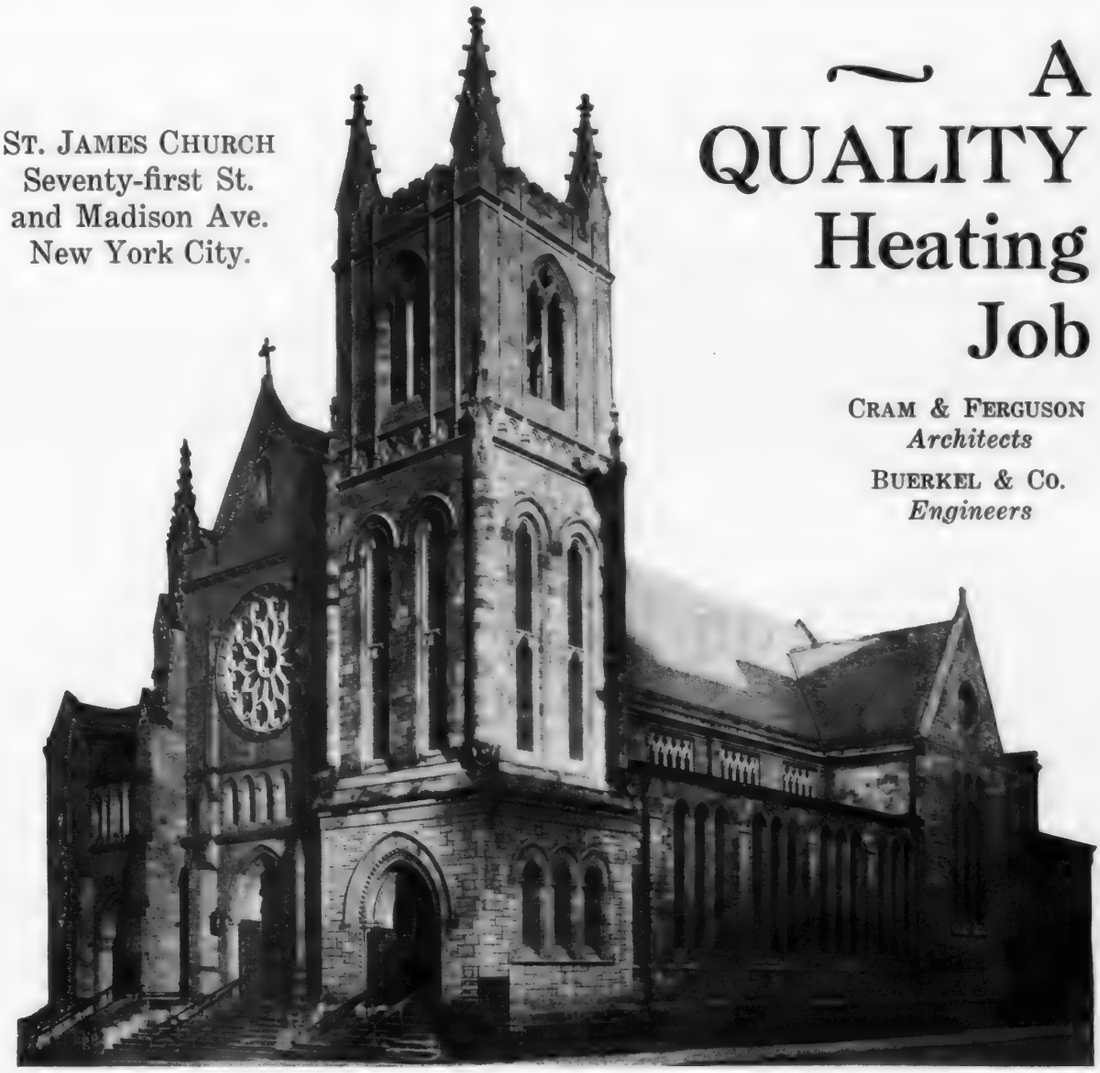
John W. Mabbs
431 So. Dearborn St., Chicago, Ill.

United States Radiator Corp'n
General Offices: Detroit, Mich.

SARCO COMPANY, Inc.
183 Madison Ave., New York

Taylor-Forbes Company
Canadian Agents Guelph, Ont.

ST. JAMES CHURCH
Seventy-first St.
and Madison Ave.
New York City.



A QUALITY Heating Job

CRAM & FERGUSON
Architects
BUERKEL & CO.
Engineers

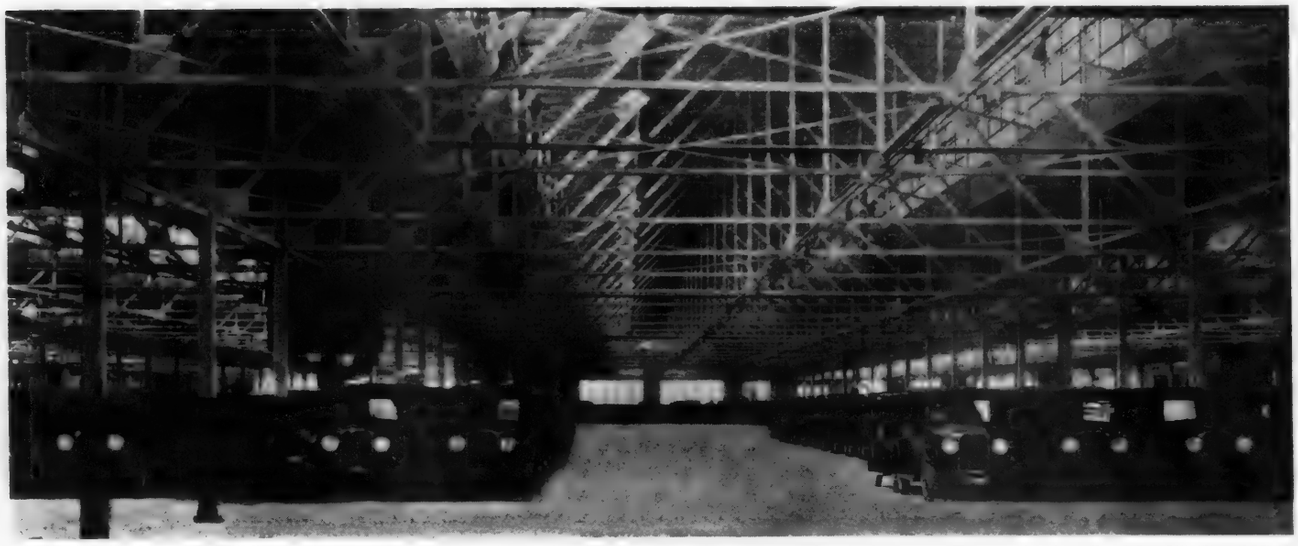
When a Barnes & Jones Heating System was selected for this fine church edifice, designed by Cram & Ferguson and engineered by Buerkel & Co., *quality* was the determining factor in the specification. Whether in church, school, residence, office building, hotel, industrial plant or other structure, *Quality* in the heating system assures comfort, convenience, quietness, fuel economy, efficiency of operation and permanency. These are advantages which distinguish Barnes & Jones Modulation and Vacuum Steam Heating Systems, assured by 30 years of experience.

Barnes & Jones

Modulation Vapor and Vacuum Heating Systems of Proven Quality

128 Brookside Ave.
Jamaica Plain, Boston

101 Park Avenue
New York City



The Austin Company
Designers and Builders

Car Storage Building
432 ft. x 762 ft.

American Blower Company
Fan Heating Apparatus

The Pontiac (Mich.) Plant Oakland Motor Car Company

One of the most modern Plants in America, with
35 acres of Floor Space unencumbered by old-fashioned Heating Equipment

is heated by

169 overhead American Blower Company *Venturafin* Units
containing nearly 75,000 sq. ft. of

AEROFIN

the modern Fan System Heating Surface

Not only was Aerofin selected as best for this mammoth job but Aerofin,—compact, light in weight, non-corrosive, durable *and lowest in installed cost*,—***made possible*** the modern engineering which achieved comfortable, uniform, economical heating without encumbrance of floor space, and Aerofin,—in easily-handled, completely encased Units requiring no internal connections,—helped to make possible the completion of this gigantic plant in the record-breaking time of seven months!

Truly, whatever you've wished for in a Fan System Heating Surface you'll find in Aerofin.

Complete information, with valuable Technical Data, covering either Low or High Pressure Aerofin, or both, will be sent upon request.

AEROFIN CORPORATION

Burnham Building
CHICAGO

750 Frelinghuysen Avenue, NEWARK, N. J.
39 Cortlandt Street, NEW YORK

Oliver Building
PITTSBURGH

LOW PRESSURE AEROFIN
For pressures up to 50 lbs.
Tube-plate Construction

[*Aerofin is sold only by Manufacturers of nationally advertised Fan Heating Apparatus*]

HIGH PRESSURE AEROFIN
For pressures from 25 to 350 lbs
Continuous Seamless Tubes

MASSACHUSETTS

MODIFIED SQUIRREL CAGE FANS

Union Station Garage, Chicago, Ill.
320' x 150'

Supply System 60,000 cubic ft. of air per minute per floor.

Exhaust System 45,000 cubic ft. of air per minute per floor.

Davis D. Meredith, Chicago, Arch.

R. C. Wiebolt Co., Gen. Contractor

Reliable Sheet Metal Works, Ventilating Contractor, Chicago

Arcade Steam Heating Co., Heating Contractor, Chicago

Adaptable
TO ALL NEEDS

AS manufacturers of heating and ventilating equipment for all types of service we are in position to recommend from wide experience the equipment which will perform most economically and satisfactorily under the varying conditions which present themselves among a wide variety of installations covering many types of buildings.

On the Union Station Garage shown above our engineers recommended a central fan system which upon completion shows remarkable efficiency and unusual economy of operation.

The Bishop & Babcock Line comprises Vacuum and Vapor low pressure Heating Specialties; a complete system of Automatic Temperature and Humidity Control; Massachusetts Squirrel Cage Fans, Air Washers and Unit Heaters.

Architects and Engineers who standardize on Bishop & Babcock Apparatus, insure uniformity in design and operation not to be found in equipment of varied manufacture.

MASSACHUSETTS BLOWER DIVISION *of*

THE BISHOP & BABCOCK SALES CO.

General Offices 4901-4915 Hamilton Ave., N. E.

CLEVELAND, OHIO

BISHOP & BABCOCK

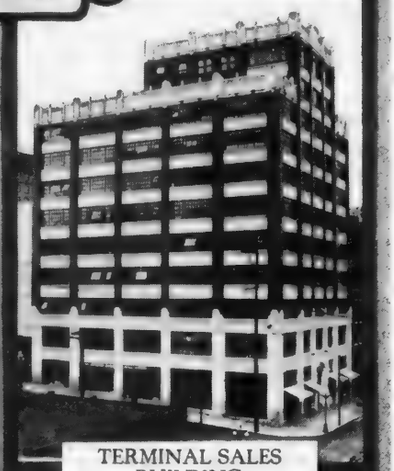
TEMPERATURE REGULATION
HEATING SPECIALTIES VENTILATING EQUIPMENT

ROOSEVELT SCHOOL
F. A. Naramore, Architect
Seattle, Washington

ST. VINCENT HOME
John Graham, Architect
Seattle, Washington

ILLINOIS HEATING SYSTEMS

LIGGETT BUILDING
Lawton & Moldenhour, Architects
Seattle, Washington



TERMINAL SALES BUILDING
Henry Bittman, Architect
Seattle, Washington

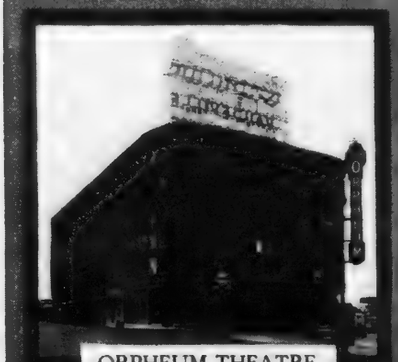
WHERE heating requirements are most exacting—where both fuel economy and luxurious comfort are demanded—you will find ILLINOIS Heating Systems.

"ILLINOIS" are the *original* vapor systems, [circulation at pressures below atmosphere] —*pioneers* in the prevention of overheating. They have a background of over 25 years experience and thousands of enthusiastic owners.

This page shows a few of the Seattle buildings equipped with ILLINOIS Systems.

Write for Bulletin 22

SEE OUR CATALOGUE IN SWEETS



ORPHEUM THEATRE BUILDING
Rapp & Rapp, Architects
Chicago, Illinois

STRATFORD HOTEL
Andrew McQuaker, Architect
Seattle, Washington

REPRESENTATIVES IN 40 CITIES OF U.S.A.

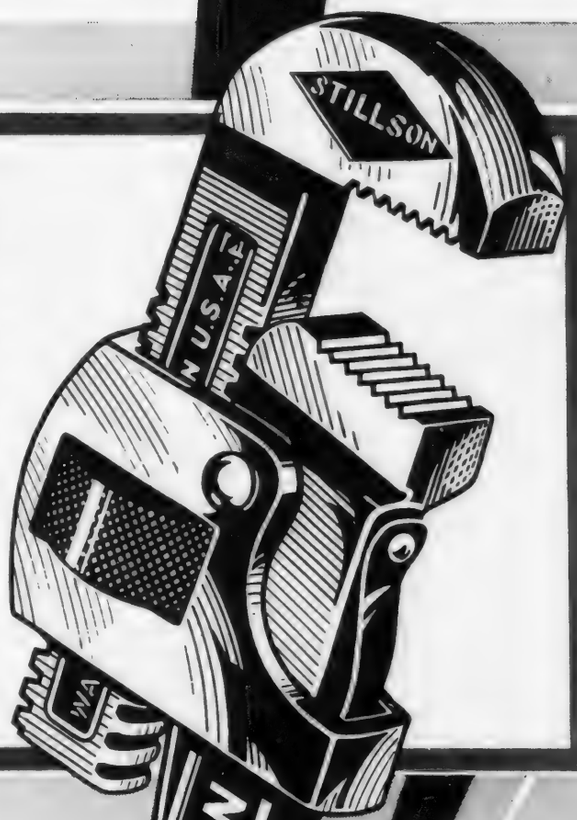
ILLINOIS ENGINEERING COMPANY

ROBT. L. GIFFORD President INCORPORATED 1900

CHICAGO

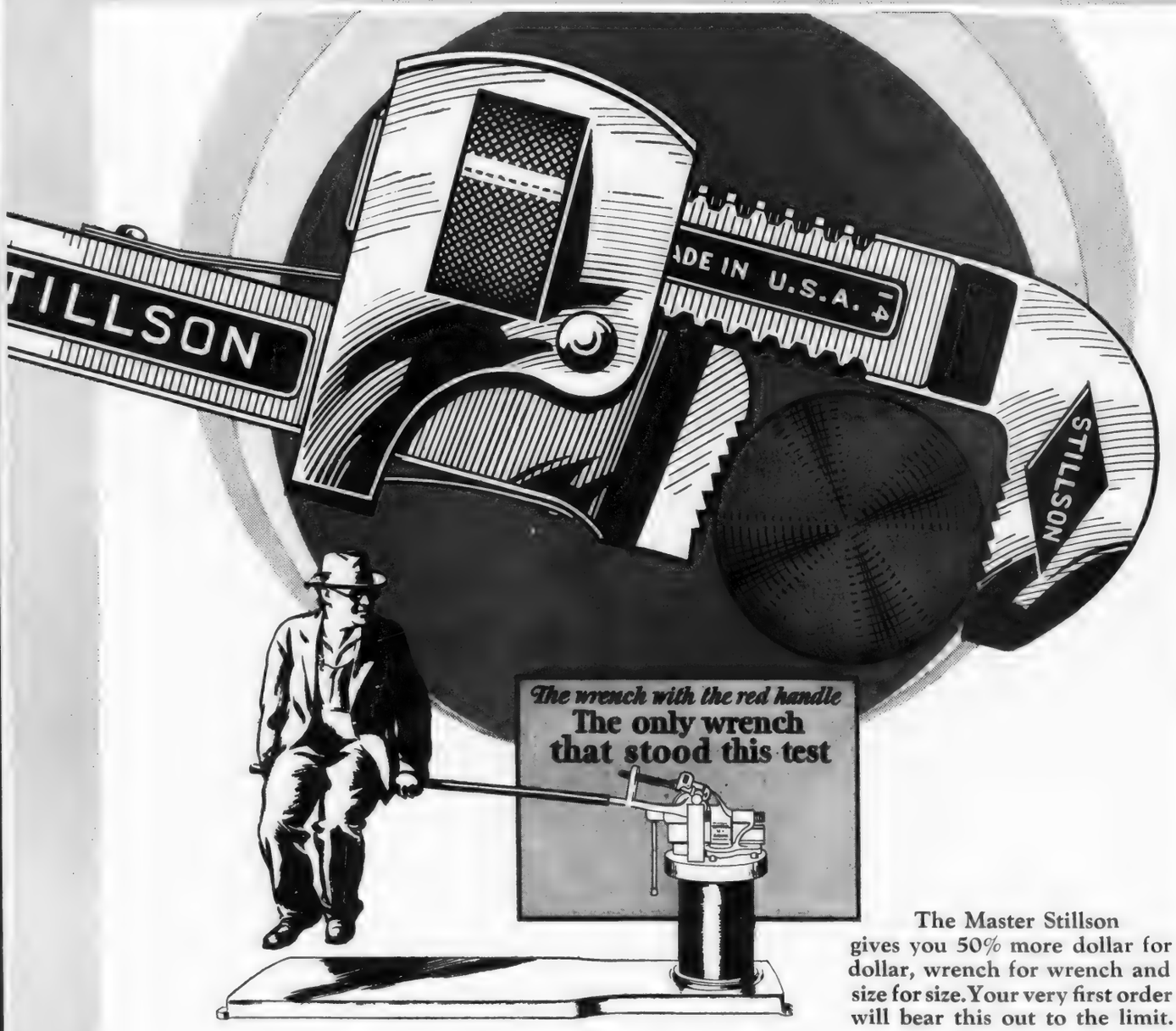
WALWORTH MASTER STILLSON

A good many people have been trying to make a pipe wrench as good as the genuine Walworth Stillson ever since Dan Stillson made his first wrench in the Walworth shops 59 years ago. In the meantime we have made and sold more than 30,000,000 of them. Now, however, we have made a better Stillson—the Walworth Master Stillson—unchanged in basic design, but constitutionally stronger and tougher than even our own original Walworth Stillson. Facts which support this statement are set forth on the following page.



TRADE MARK
STILLSON
REGISTERED U.S. PATENT OFFICE

With the [illegible] handle



The Master Stillson gives you 50% more dollar for dollar, wrench for wrench and size for size. Your very first order will bear this out to the limit.

. . .

More Strength in the Bar

A load of 1800 pounds exerted on the Master Stillson in the normal position of use failed to bend the bar or damage any part of the wrench.

This is the only pipe wrench of its kind that has been able to survive this test without distortion or without breaking.

More Toughness in the Jaw

An improvement in Walworth's own method of heat treatment has increased the strength of the Master Stillson's jaw against strain, twist or sudden impact.

More Resistance in the Teeth

New processes of steel hardening and a slight change in the angle of the teeth have given them ample resistance to survive shocks and excess loads. They will neither shear off nor flatten under strains and pulls which even the old Walworth Stillson could not withstand.

WALWORTH

WALWORTH INTERNATIONAL CO.
Foreign Representative. 11 Broadway, N. Y.

Distributors in Principal Cities of the World
General Sales Offices: 51 E. 42nd St., New York

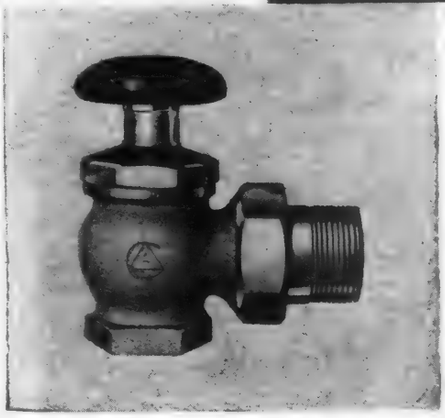
WALWORTH CO., LIMITED
10 Cathcart St., Montreal, P. Q.

MASTER STILLSON

TRADE MARK STILLSON REGISTERED U.S. PATENT OFFICE

A scene like the one pictured above never occurs when the radiators are equipped with

ARCO
Packless Valves No. 988



ARCO Packless Valves are made in angle corner and globe patterns, of wheel or lever handle construction, for steam, water, vapor or vacuum installations.

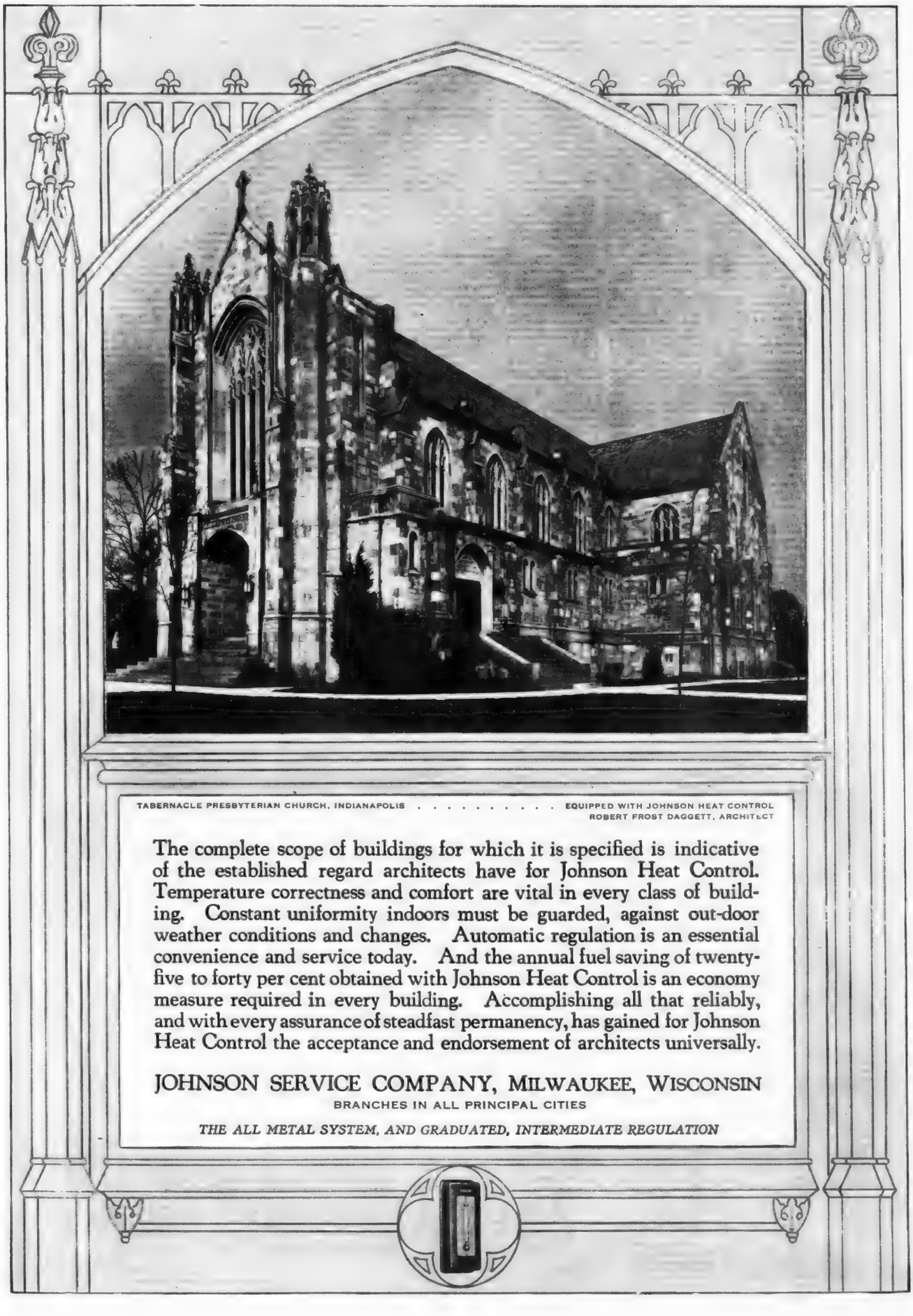
A story every journeyman can tell ‘ ‘ Every buyer wants quality and performance ‘ ‘ not a few cents price reduction. All you have to do is tell your customer that ARCO Packless Valves are less expensive in the long run because their first cost is the only cost. It's a very simple story ‘ ‘ ARCO Packless Valves do not need annual repacking and they never leak.

Individualize your installation by having your name etched in nickel on the black dial. Identify your work with the satisfaction the customer is bound to experience with an ARCO Packless Valve installation.

AMERICAN RADIATOR COMPANY

40 W. 40th Street ACCESSORIES DIVISION New York, N. Y.

Makers of IDEAL Boilers, AMERICAN Radiators, ARCO Tank Heaters, VENTO Ventilating Heaters, AIRID Air Valves, MERCOID Controls and devices for drying, humidifying, cooling and refrigeration



TABERNACLE PRESBYTERIAN CHURCH, INDIANAPOLIS . . . . . EQUIPPED WITH JOHNSON HEAT CONTROL
ROBERT FROST DAGGETT, ARCHITECT

The complete scope of buildings for which it is specified is indicative of the established regard architects have for Johnson Heat Control. Temperature correctness and comfort are vital in every class of building. Constant uniformity indoors must be guarded, against out-door weather conditions and changes. Automatic regulation is an essential convenience and service today. And the annual fuel saving of twenty-five to forty per cent obtained with Johnson Heat Control is an economy measure required in every building. Accomplishing all that reliably, and with every assurance of steadfast permanency, has gained for Johnson Heat Control the acceptance and endorsement of architects universally.

JOHNSON SERVICE COMPANY, MILWAUKEE, WISCONSIN
BRANCHES IN ALL PRINCIPAL CITIES

THE ALL METAL SYSTEM, AND GRADUATED, INTERMEDIATE REGULATION

CON-TAC-TOR

The above illustration shows the No. 26AR Convoswitch without its cover. This is the Room Temperature Control which starts and stops the unit heater as the room temperature falls and rises, thereby maintaining even temperatures and maximum comfort.

The No. 56R Aquaswitch shown above is the Limit Control recommended for every automatically operated unit heater installation. It prevents the unit heater from running when the steam coils are cold and thus insures that only warm air will be ejected.

"THE WHOLE TRUTH—"

IT is true that Unit Heaters reduce the original cost as well as the operating cost of industrial heating installations. It is also true that Con-Tac-Tor Automatic Controls will make those same Unit Heaters produce at greater efficiency and with greater comfort.

Those who sell Unit Heaters without automatic control are overlooking one of their best sales points—increased efficiency. Those who operate Unit Heaters without automatic control pay more for their heat. Sell the whole truth.

Con-Tac-Tor Controls are not expensive and they are easily installed on either new or old unit heating equipment. Complete information will be sent without obligation on your request.

Please send Bulletin 141E and quote prices on Unit Heater Controls.

Name .....

Address .....

City ..... State .....

HV628

ABSOLUTE CON-TAC-TOR CORPORATION

ELKHART INDIANA

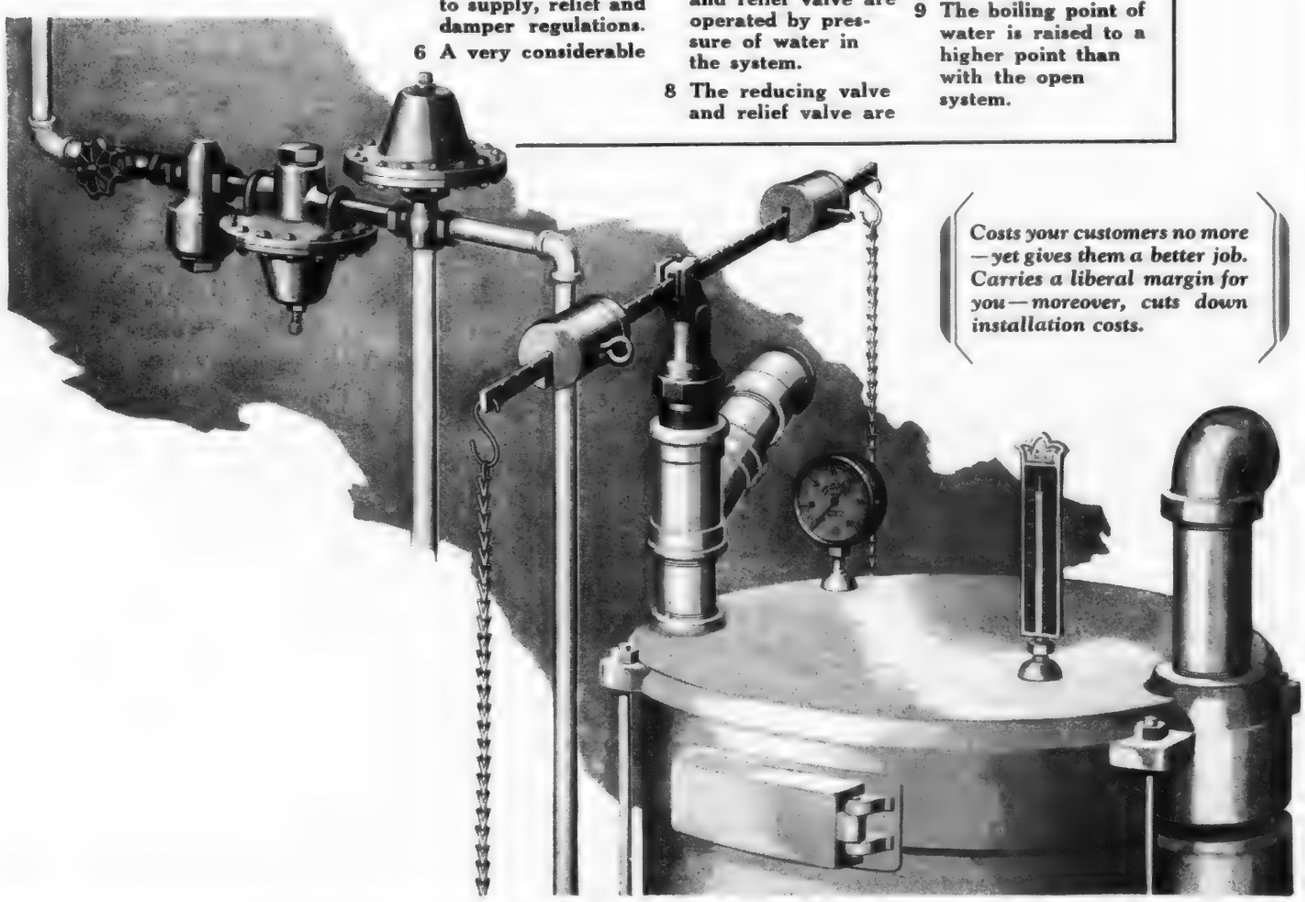
What most owners never

Why a modern heating system ever needed anything as clumsy as an expansion tank, is more than the owners of most hot water heating systems could ever understand. Needless to say, after they once find out that these inefficient, bothersome, leaky tanks are no longer necessary, any one is going to have a pretty stiff job on his hands who trys to include one in his heating system specifications.

As a matter of fact, the Mueller Heat Control System does all the work of an expansion tank—and more!

MUELLER HEAT CONTROL ADVANTAGES

1. No expansion tank either open or closed.
2. Quickly installed on either new or old jobs.
3. Water in system always fresh.
4. Rapid circulation due to pressure and fresh water.
5. Entirely automatic as to supply, relief and damper regulations.
6. A very considerable saving in fuel, due to automatic control of dampers and rapid circulation.
7. Perfectly safe, as both reducing valve and relief valve are operated by pressure of water in the system.
8. The reducing valve and relief valve are positive in action and durable, the working parts being made of bronze with phosphor bronze diaphragms.
9. The boiling point of water is raised to a higher point than with the open system.



Costs your customers no more —yet gives them a better job. Carries a liberal margin for you—moreover, cuts down installation costs.

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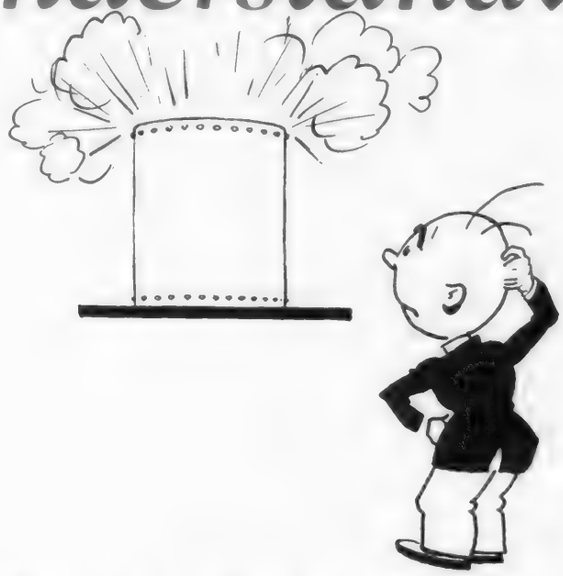

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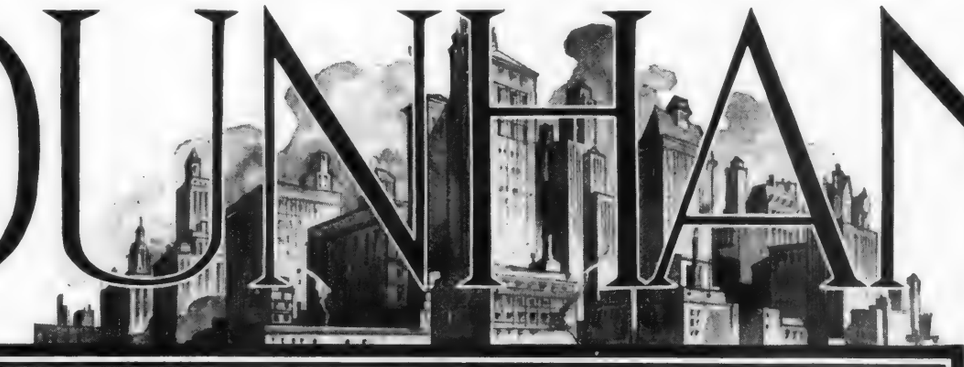

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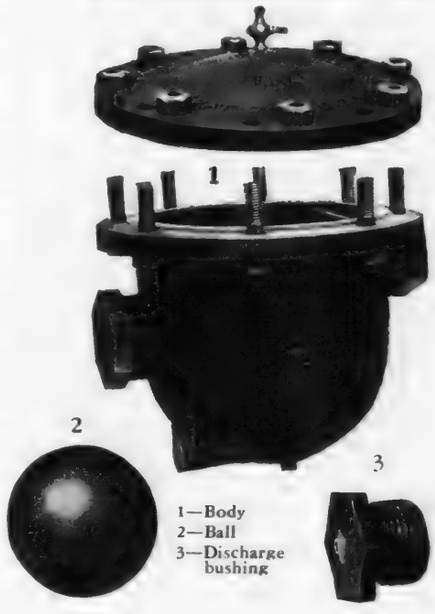
This illustration shows the simplicity of the Johns-Manville Steam Trap.



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2—Ball
3—Discharge bushing

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Fig No. 209
PACKLESS VALVE

Fig. No. 12
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Fig. No. 1
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Fig. No. 85
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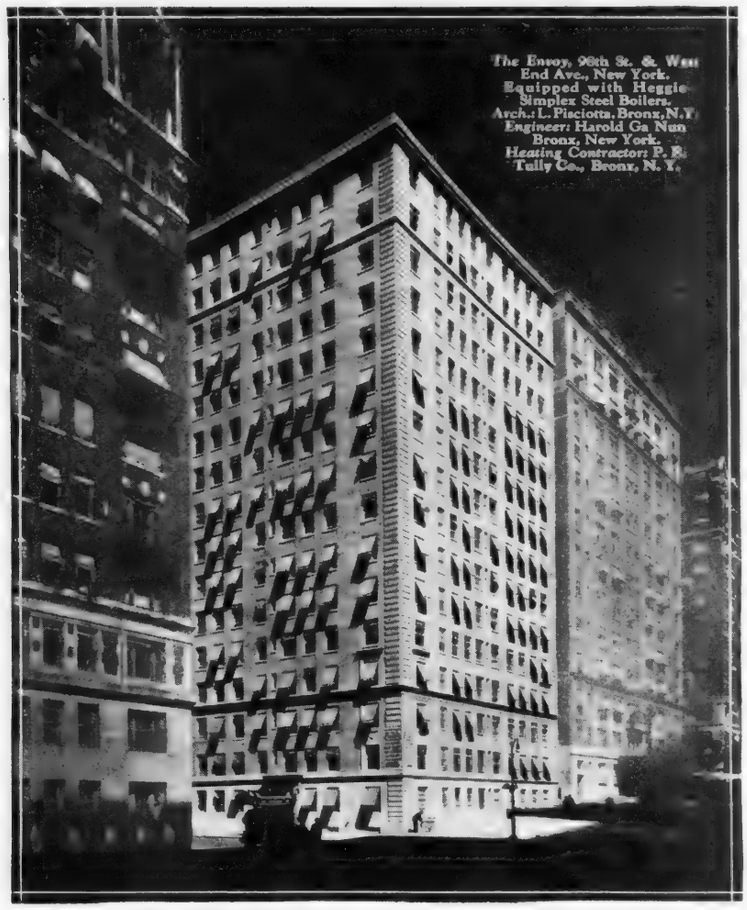
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The Heating and Ventilating Magazine

VOL. XXV

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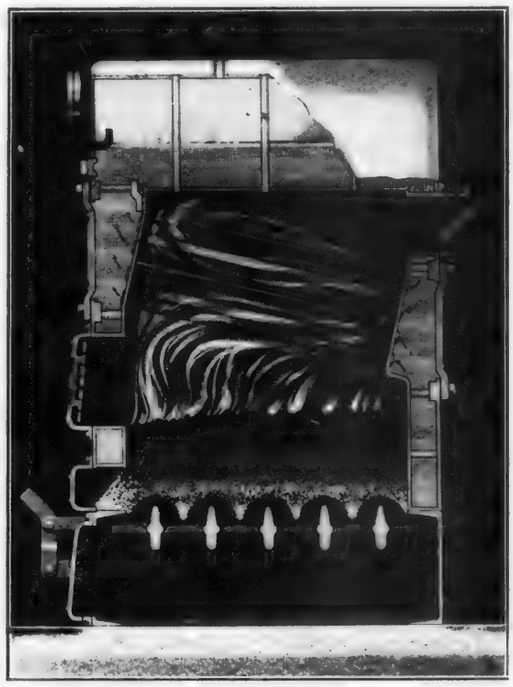

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The Heating and Ventilating Magazine

A Monthly Journal of Engineering Progress

JUNE, 1928

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Business District of Shreveport, La.—The Smokeless City—Where Gas Is the Universal Fuel

Gas Heating for the Heating Contractor

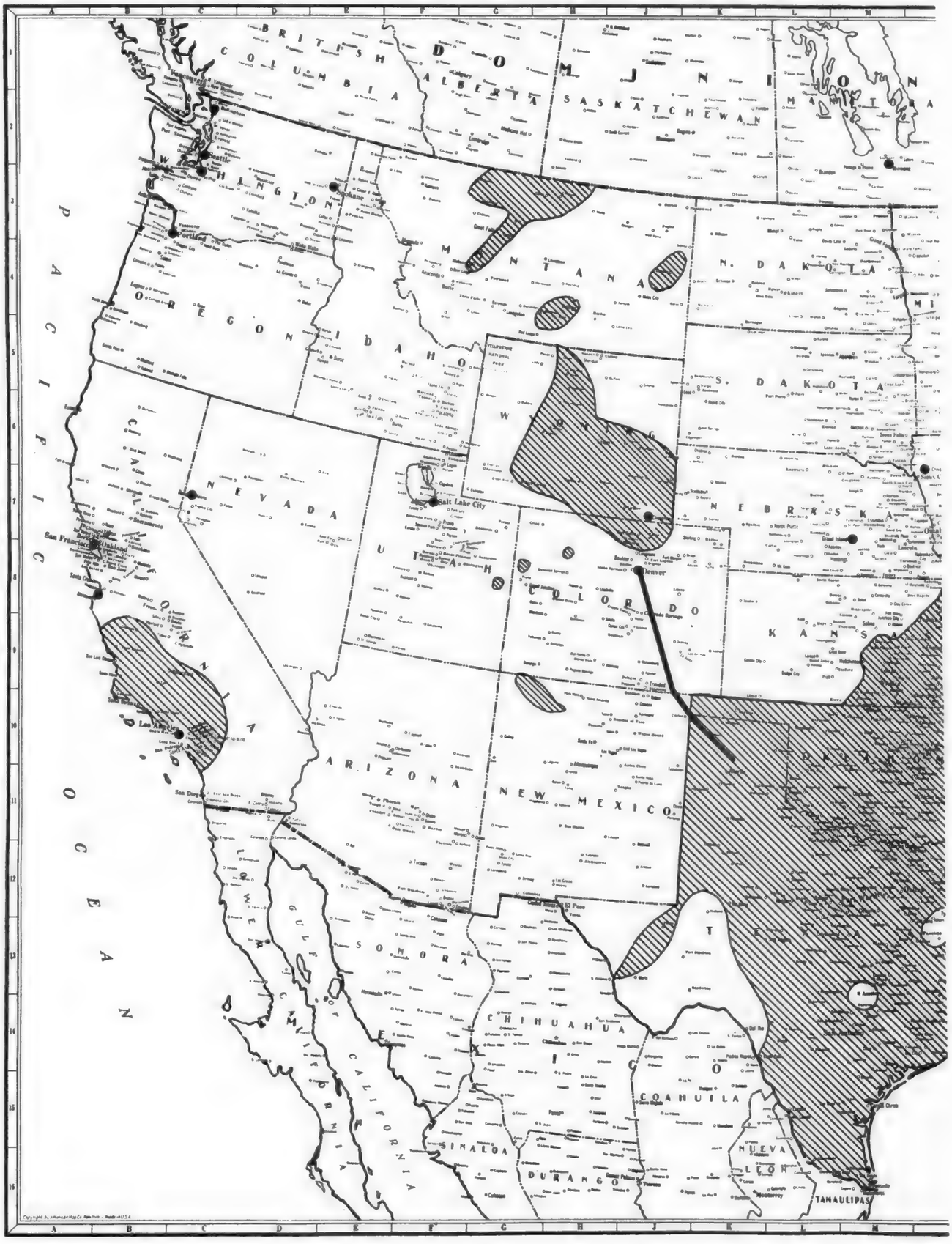
Part I—A Survey of the Areas in Which Gas Is Available as a Domestic Fuel and a Study of the Opportunities Open Through the Increased Use of This Fuel

By G. C. Carnahan

GAS, both manufactured and natural, is being used more and more as a domestic fuel and is being hailed by the more optimistic of those interested in its use as "The Fuel of the Future."

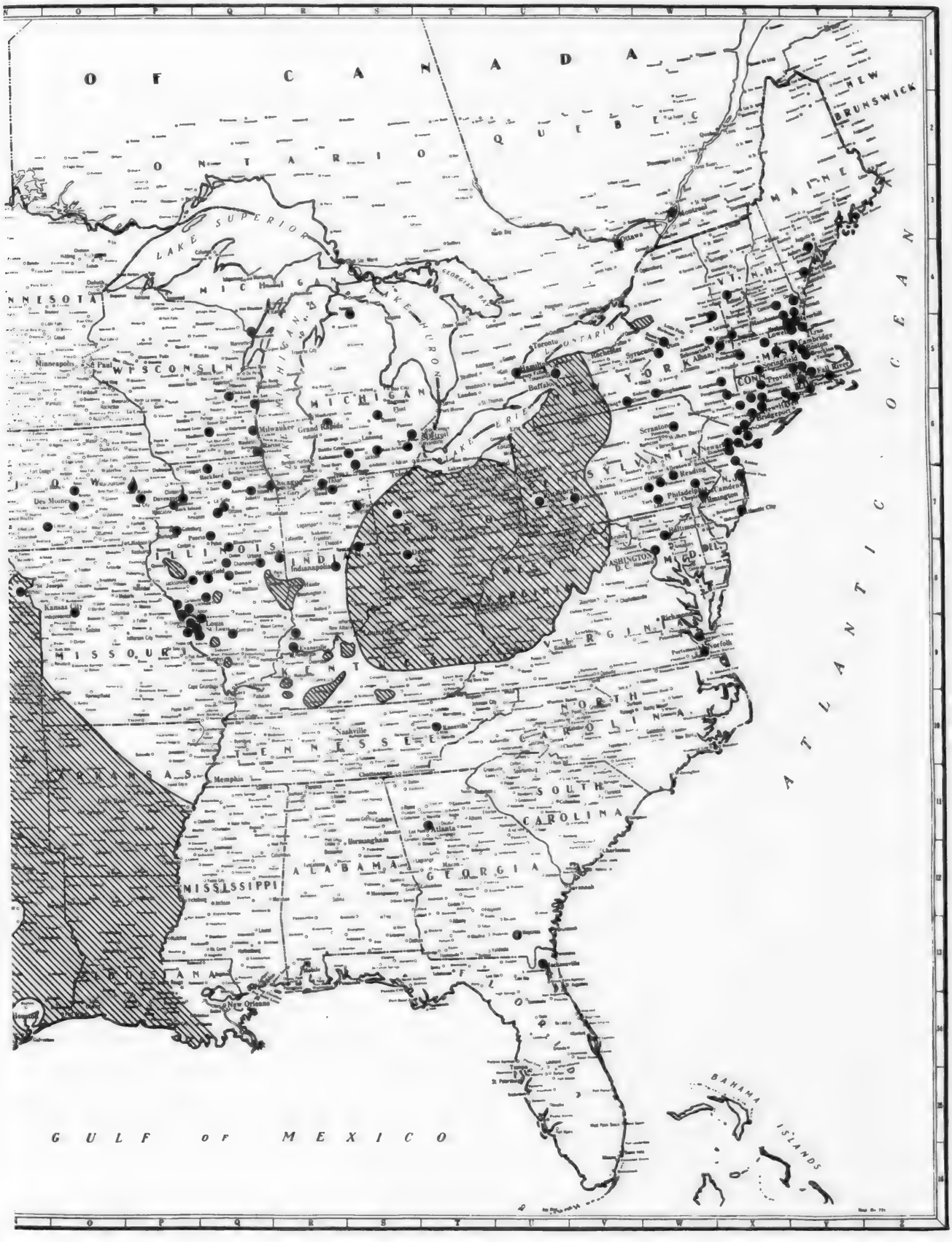
As late as three or four years ago this fuel was available for domestic use only in a few scattered localities. A general awakening has taken place within the last few months and to-day gas companies all over the United States are feeling their way in this new field of endeavor.

Viewing this progress in the different parts of



The Potentiality of

Areas Where Natural Gas Is Available, Usually at Low Rates, Are Indicated by Shaded Portions. Cities Having Special Gas Rates for Heating Are Marked by Solid Circles. To Show the Tremendous Distances Over Which Gas Is Piped, the New 350-Mile Trunk Pipe Line, from the Amarillo Field to

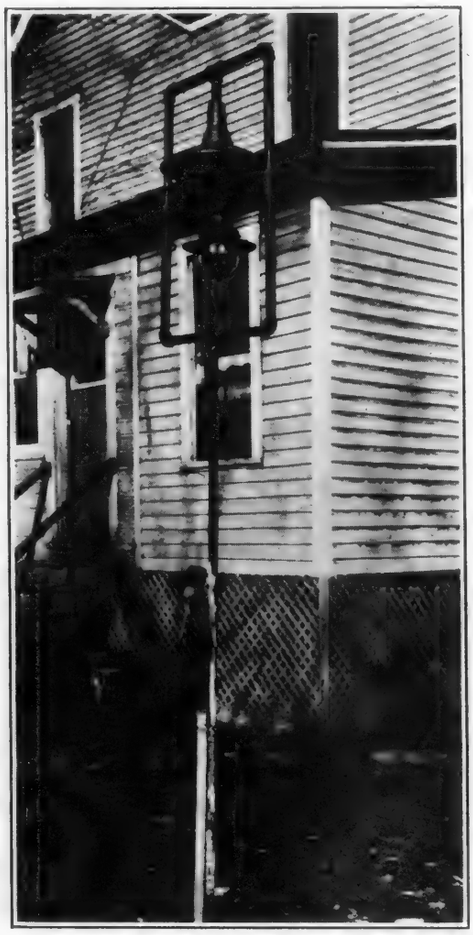


Gas as a Fuel

Denver, Is Indicated by the Heavy Line. Gas Trunk and Distributing Pipe Lines from Gas Fields to Important Centers and Within the Gas Fields Are So Numerous and Overlapping that They Could Not Be Shown on a Map of This Size.

the country, it is evident that the rate of progress is more marked in some sections than in others. To state the case conversely, gas for heating is slow in developing in some localities because of the lack of one or both of the two prime essentials for its success. Only a superficial study of the situation is needed to show that, for gas to be successful, its cost must be competitive with other available fuels, and the service must be dependable. There are many other factors that influence the extent to which gas is used in preference to other fuels, but without a competitive price and a dependable supply delivered in a uniformly usable quality, gas heating cannot attain dominance as a heating fuel in any locality.

In comparing the cost of one fuel with another, the true basis of comparison is the total cost of producing the result, rather than the cost of a definite amount of available heat in the form of coal, oil or gas. Furthermore, misuse of any fuel, either in firing or in the type of heating plant or appliance in which it is burned, will often change it from a competitive fuel to one too expensive or otherwise unsatisfactory. Gas holds advantages eliminating certain items of expense in heating that are unavoidable with other fuels and that go a long way in placing it in the competitive class.



In the Natural Gas Belt Where Gas Is Still Used for Street Illumination, It Is Cheaper to Allow the Lamps to Burn Day and Night Than to Extinguish Them in the Morning and Relight at Dusk

Savings accrue to the use of gas for heating from such items as the absence of fuel storage and handling charges incidental to both solid and liquid fuels. Cleanliness and the close regulation of the amount of heat to the requirements lead to savings that must be taken into consideration in evaluating the ultimate cost of gas heating.

THE NATURAL GAS SITUATION

Natural gas, of course, is more competitive than manufactured, from a cost standpoint. Many people have an idea that natural gas production is on the decline. The facts are quite to the contrary as 1,239,000,000,000 cu. ft. of natural gas was sold during 1926, which was nearly a 4% increase over 1925, and a 50% increase over 1920. There are four distinct large areas where natural gas is available and where it is now either the leading fuel, or has been the leading fuel with strong probabilities of being re-established as the leader. How this re-establishment of natural gas is accomplished in fields where seasonal demands exceed the supply will be discussed later.

The eastern natural gas region covers Ohio, western Pennsylvania and New York, extends south into West Virginia, and includes the northern portion of Kentucky and southeastern Indiana. The southwestern fields supply the greater part of Texas, Oklahoma, Kansas, Arkansas and Louisiana. The scope of this field is being extended to serve Denver and the intermediate cities and towns between there and Texas. Natural gas is on its way to Galveston and New Orleans.

Great resources of undeveloped natural gas exist in northern Texas. The gas reserves here have been estimated at from 10,000,000,000,000 to 15,000,000,000,000 (ten to fifteen million million) cu. ft. This reserve is between five and nine times the combined total sales of manufactured and natural gas in the United States during 1927. With this vast reserve it is only a question of a few years before Austin will be supplied, which will give all the principal cities of Texas, except El Paso, a supply of natural gas. El Paso will undoubtedly be supplied from Fort Bliss in western Texas.

A field in southern California supplies the region in and around Los Angeles. There is also a considerable quantity of natural gas in Montana which supplies Butte and which is being piped to Great Falls, Helena and intermediate points. Cheyenne in northern Colorado is also supplied. These are the four distinct large natural gas territories. Other smaller regions, such as in and around Amory, Miss., and in Michigan, have a local supply. The use of natural gas is increasing, and with the completion of pipe lines already under construction, and others being planned, it is certain that a still larger percentage of our population will be using this ideal fuel. Natural gas sales are about two and one-half times greater than manufactured gas, yet it is available to only one-third the number of people.

In some sections of the natural-gas regions the price is ridiculously low, and in spite of its misuse, and in some instances indifferent supply, it is the leading fuel. In some parts of the eastern gas regions, notably in West Virginia, the cost is so low that street lights are allowed to burn days as well as nights. Such conditions of extremely low-priced natural gas result in wasteful applications, and appliances are, in general, inexpensive and inefficient. Few central-heating systems originally designed for gas are used.

MANY ELEMENTS COMPLICATE PRICE PROBLEM

In several notable instances legislation has kept the price to such low points that the revenue to the producing companies does not encourage the expenditures of the necessary capital to insure an adequate supply at all times. When a large percentage of the output is for heating homes and commercial buildings a tremendous winter peak results. Unless special provisions are made in such instances, actual shortages occur during the cold winter periods. If a shortage exists when heat is most needed the use of gas for continuous heating is largely abandoned, even though the cost be the lowest of all available fuels.

In many parts of the eastern field, possible production will not equal the unusual demand existing during the near-zero periods. This situation has been met in Buffalo and in Louisville by building manufactured-gas plants that are operated only during the winter season. Enough manufactured gas is added to the available supply of natural gas to meet all needs, thus insuring a constant and dependable supply.

Prices higher than those charged in natural-gas communities must be charged, but still they are much lower than any entirely manufactured or by-product gas. Mixed gas, as this combination of natural and manufactured gas is called, is sufficiently low in price to make it a highly competitive fuel; which cannot be said of straight natural gas at one-half the price, when the supply is indifferent and often inadequate. Other cities have solved, or are preparing to solve, the winter shortage of natural gas by adding manufactured gas.

Manufactured-gas companies, until a few years ago, were reluctant about making the price concessions and sales effort necessary to put their product in the class of competitive heating fuels. They were apprehensive of creating a condition similar to that existing in some of the older natural-gas regions where the demand exceeds the supply for a few days during the winter. This would necessitate providing additional manufacturing capacity and increasing supply mains that would be used only a few days or weeks at the most but on which the capital investment and other overhead costs would have to be carried throughout the year. Many companies were satisfied to promote heating sales only for supplementary use. However, a closer study of this market revealed a number of

In the Largest Peanut-Roasting Plant in the World, One-Third of the World's Crop Is Treated in Gas-Fired Ovens

conditions that made the heating field attractive.

Some companies found that the winter peak was being forced on them without getting the heating load. This was due to consumers using gas to help out their permanent heating plants in very cold weather. Other companies realized that since they sold more gas in summer than in winter, the heating load would be the thing that would make gas sales more nearly uniform throughout the year.

The available supply of by-product gas from steel and coke plants has increased. Gas from coke plants now is being utilized to a much greater extent than in former years due to its increase in value, brought about by the rise in price of coal and natural gas. Some gas companies found that they must increase their sales materially in order to make money. Nearly all have reached the conclusion that a considerable amount of heating business could be added without seriously unbalancing the ratio of their winter and summer sales.

THE INFLUENCE OF CLIMATE

Climatic conditions have a great influence on the adoption of gas for heating. In the south and southwest and on the Pacific Coast the winter seasons are not extremely cold but the heating requirements are variable. Heat is required only part of the day, at certain seasons. Outside temperatures requiring continuous heat may exist for only a few days at a time. Gas heating meets these variable conditions better than any other fuel because of its quick response to demands, and the ease with which the volume of heat can be controlled.

Winter tourists have increased the demand for heat in these warmer climates. Northern people require more heat in milder winter climates than the permanent residents. Many tourists being accustomed to gas for either auxiliary or complete

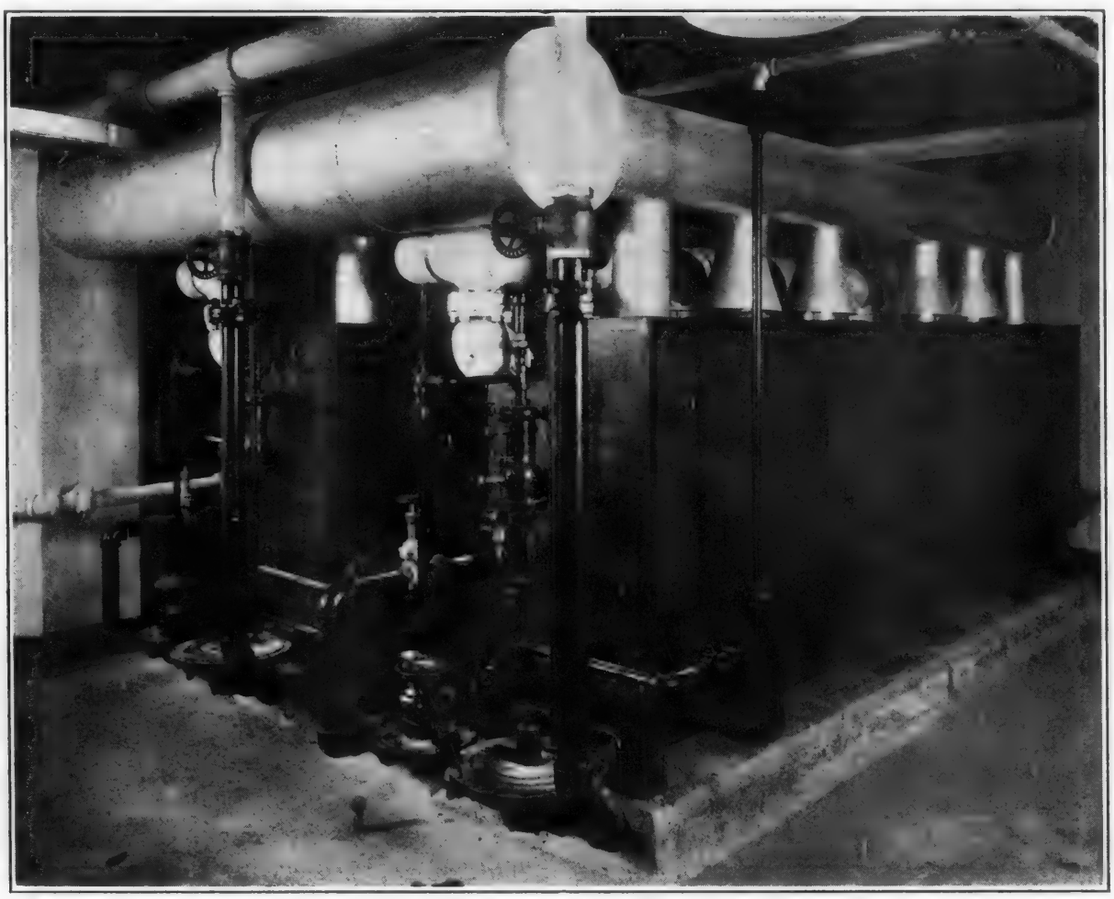
heating have turned to it again in these vacation climates. Gas-appliance manufacturers, originally selling most of their output in the natural-gas regions, have sought new markets and extended their sales efforts to the manufactured-gas territories. They have done much to educate home owners to the advantages of gas heating.

Employees of industrial concerns using manufactured gas for large-scale heat operations such as brass melting, forging, annealing, enameling, brick burning and many other processes, have become accustomed to the use of large quantities of gas. They have been converted to its advantages of cleanliness and ease of control; they have observed wide price differences between gas and other fuels change to the advantage of gas by increased production and superiority of finished products. This contact with industrial gas uses has done much to lay a firm foundation for home heating among large numbers of industrial-plant owners, department managers, foremen and even the workmen.

Because of these and many other conditions the manufactured-gas companies have been forced to a complete change in attitude toward gas heating, and within the last few years have devoted determined and well-organized selling effort to establish gas as a heating fuel. In most cases this effort is being augmented and ably assisted by gas-appliance manufacturers. During 1926, the manufactured-gas companies supplied gas to 11,400,000 consumers. By no stretch of imagination can all of these be classed as potential prospects for complete gas heat, but even a small percentage presents a tremendous potential market. Undeniable success has rewarded this concerted selling effort. At the close of 1926, a census of the manufactured-gas companies showed that there were about 30,000 central gas-fired heating systems and more than 40,000 other buildings heated entirely by gas-burning unit heaters, which consisted largely of gas-fired steam radiators and similar heating equipment. In this second group of business secured is a large percentage of commercial heating which is easier than residential heating to secure in northern climates because savings in space and fuel-handling charges are more apparent and very often make the ultimate cost of gas heating lower, even at prevailing general rates for manufactured gas, than with the apparently cheaper crude fuels.

Sales in both manufactured- and natural-gas territories have progressed faster in some localities than in others because of the existences of the previously outlined and other local influences. An analysis of the various sections of the United States will serve to illustrate more clearly how competitive price, reliability of supply, climatic conditions and other local influences have helped or retarded the adoption of gas as a heating fuel.

(This is the first of a series of articles dealing with conditions in the gas house-heating field as they exist to-day.)



A Midwestern Office Building Uses Manufactured Gas for Fuel

Clinton Street Entrance of Union Station Garage, Chicago, Showing Use of Roof for Open-Air Parking

Heating and Ventilation of a Large Garage

Adapting Modern Equipment to Meet Specific Requirements

By Edward T. Blaker

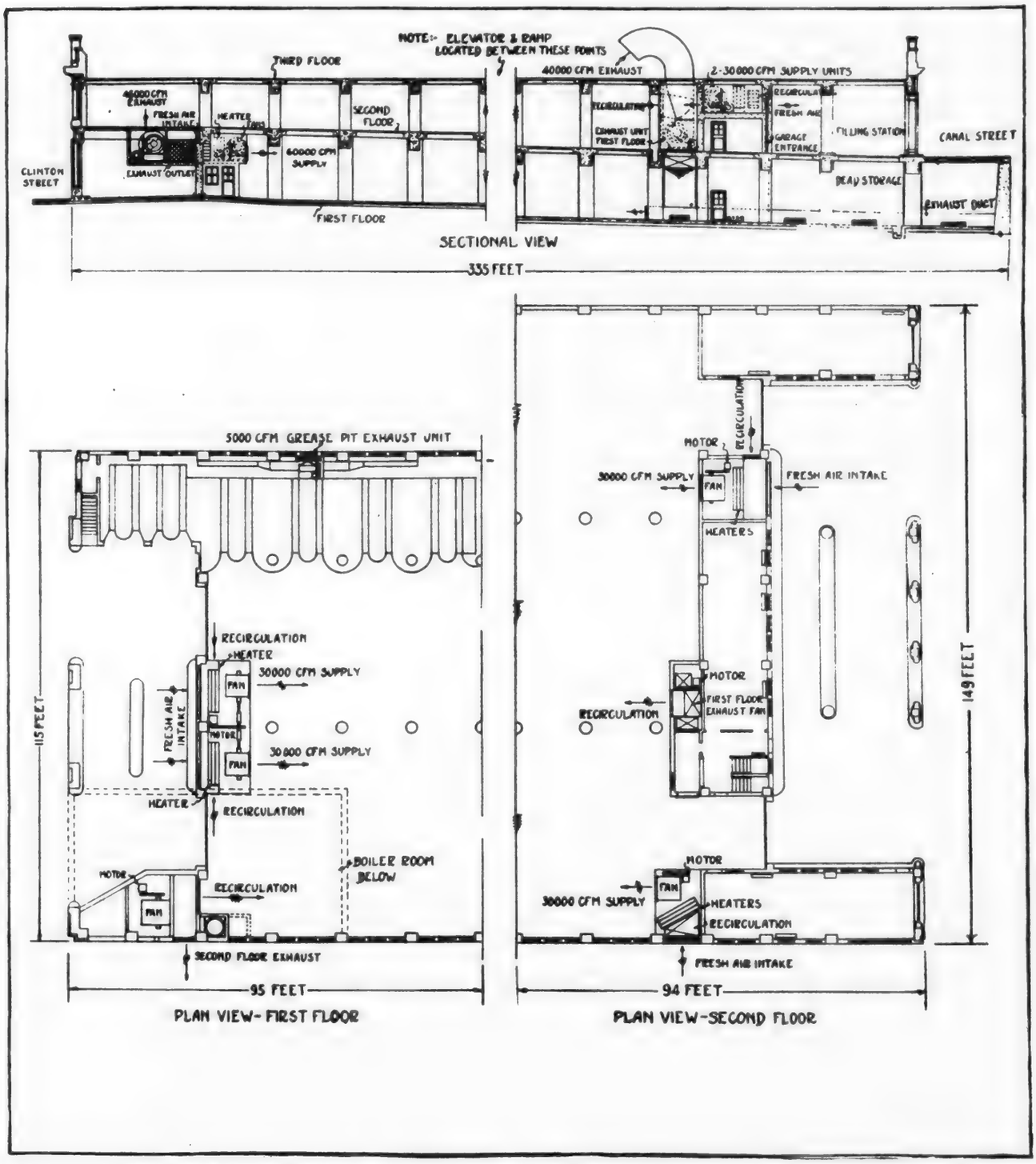
IN designing a heating and ventilating system for a building, the initial consideration naturally is that of the building itself. The architect first must consider the adaptation of this building to the requirements of what it is to house; also the ground conditions existing. A specific case is a downtown Chicago garage building extending an entire block, from Clinton Street to Canal Street. Clinton Street is approximately 10 ft. lower than Canal Street, consequently the garage had to have entrances on two floors.

The first floor, opening on Clinton Street, is to be used as a service floor, containing greasing and washing racks and service space; it is adapted for storage of trucks and dead-storage space, as well as being a secondary feeder to other floors. This made it necessary that the first floor should have a high ceiling. In order to accomplish this, and to maintain a height necessary for large trucks, the first and second floors had to be sloped downward from Clinton Street to Canal Street to make up the difference between their ceiling heights and difference in elevation between these two streets.

Opening on Canal Street, the second floor is the primary feeder for the building. From it cars are taken by ramp to the upper floors. Connection between the second and first floors is accomplished by means of an elevator so that those cars requiring service are delivered to the first floor, and any overflow of trucks also could be delivered to the first floor by this means.

Present building construction is limited to first and second floors only, with a ramp to the third floor, which is now being used as open parking space for pleasure cars. Including the third-floor roof, the fourth and fifth floors will be a future addition to accommodate pleasure cars only. With this problem in mind, foundations and structural work for the first, second and third floors were built sufficiently heavy to accommodate additional floors. Across the building is a beam construction, which had to be seriously considered in the problem of heating and ventilating. The height of the second floor, at the Canal Street entrance, was sufficient for an office mezzanine.

As outlined above, the design of the building



Plan and Elevation of Union Station Garage, Showing Arrangement of Ventilation Equipment

naturally came first in consideration of the heating and ventilating system. Other vital factors were temperature requirements, Chicago Ventilation Code requirements, fire protection requirements and the installation of a system of low first and operating costs and requiring minimum floor space.

CODE AND OTHER REQUIREMENTS AND LIMITATIONS

Points allowable for intake and ejection of air were limited by the shape of the building and adjoining property. Street entrances were the most practical points of entrance for fresh air, and the height of the ceiling permitted taking this air at a distance of 10 ft. or more above the grade. The best points of air ejection were on the alley side and through the roof.

A complete air change on each floor every six minutes, or an allowance of 5000 cu. ft. of air per minute for each moving car, was required by the Chicago Ventilation Code.

The code further required that at least 75% of

injected air be ejected by mechanical means. With the floor area involved, and considering that 12 cars would be the maximum moving on a floor at any time, 60,000 cu. ft. of air per minute supplied, and 45,000 cu. ft. of air per minute exhausted, was required for each floor.

Because of the fire-protection code, which requires the separation of one floor from the other by fireproof means, each floor must have its own ventilation system.

Physical requirements of the building were such that a fairly even temperature should be maintained throughout the entire building. The average mean temperature was based on 50° F. in all garage spaces for any lower outside temperature, and 70° F. in office spaces. The latter are heated by means of direct radiation.

VENTILATION REQUIREMENTS BASED ON CO_2

At this point must be considered the removal of carbon monoxide gas. Authorities vary in their opinion as to where this gas should be taken out. Carbon monoxide is lighter than air, and finally would rise to the ceiling. Experiments tended to prove, however, that this gas, being discharged from the exhaust of a motor, is held in suspension with two other gases approximately one-and-one-half times as heavy as air, namely, carbon dioxide and aqueous vapor. These heavier gases tend to keep the carbon monoxide close to the floor for a considerable period of time, and in order to avoid circulation of carbon monoxide gas, its ejection should be accomplished from the floor level rather than from the ceiling level. This theory was finally accepted for the basic design of the system.

One important asset of a garage is its floor space, on which the dividends are earned. Consequently, this system should, as far as possible, use a minimum of floor space.

Economy dictates that a system, after meeting these requirements, should be as economical as possible in first cost, and the factor of operating cost should not be neglected. It is not, however, the intention to indicate that these last factors should be given primary thought, but rather that engineering design to satisfy the conditions of the problem should be first, and the installation and operating costs then should be reduced to a minimum. Thus will the best interests of the owner be conserved.

The final problem to be worked out was that of recirculating during dead periods, and taking in fresh air and ejecting foul air during the live periods of garage operation. This feature was involved in a consideration of low operating cost.

A sectional and plan view shows the complete system installed for the first and second floors. The building is 335 ft. long, and in part is 115 ft. wide and in other parts 149 ft. wide.

UNIT BLAST SYSTEM MET CONDITIONS

It was decided that a blast system, to accomplish both heating and ventilation, would best meet all of the above requirements. Massachusetts double-inlet, double-width fans are used, in various sizes. Also, it was decided that such a system would be

(Continued on Page 83)

Ramp to Roof Parking Space, Union Station Garage

The Status of District Heating

Part IV—Plant of the Springfield Steam Company Typifies How Suburban Residence Localities Are Being Served

By Harold L. Alt

THE Springfield Steam Co., of Springfield, Pa., having been granted a franchise for district-heating service covering the entire town of Springfield, a suburb of Philadelphia, constructed a first-class central plant and, with the laying of street mains to serve a considerable portion of the property adjacent to the plant, plans to make extensions to outlying districts as soon as the demand for service justifies the expenditure.

While a public school, fire house, municipal building and several stores are now served by the company, the majority of its customers are those who own their own homes, having purchased them with the understanding that central heat would be provided at a definite rate. As a result many houses have been built without boiler plants, and boilers installed previous to the advent of "street steam" are being abandoned for the more satisfactory, and fully as economical, central service. In new houses being erected in this area, only radiators and piping are being installed, with a saving in first cost.

The usual type of home in this locality is the double or "duplex" house—two houses built with a common fireproof wall between. As a result of this arrangement there are but three exposed sides on each house. Between each pair of houses is an open space sufficient for a walk and a driveway to the garage in the rear.

With houses constructed in this manner, the installation of service mains is greatly minimized, it being necessary only to run underground the short space existing between every second house and the next pair of houses. This scheme was followed out in the Springfield system, and, where it was necessary to run the large mains along the streets in order to feed the smaller branches running through the houses, these mains were laid between sidewalk and curb, partially under the sidewalk so that they can be dug up without difficulty in case of trouble.

DISTRIBUTION SYSTEM

A partial plan of the distribution system is shown in Fig. 1, the piping already installed is indicated, as well as the branches through the houses from

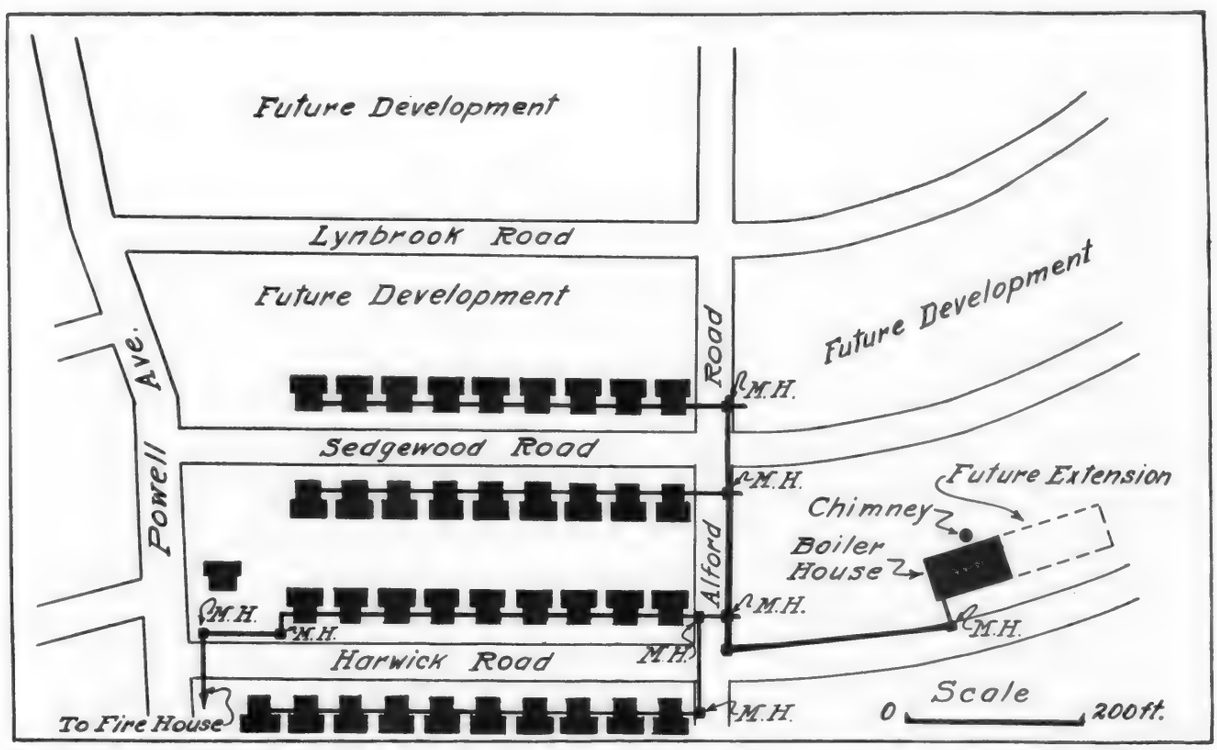


Fig. 1. Rows of Double Houses are Served by the Springfield Steam Company, the Steam Mains Passing Through the Basements

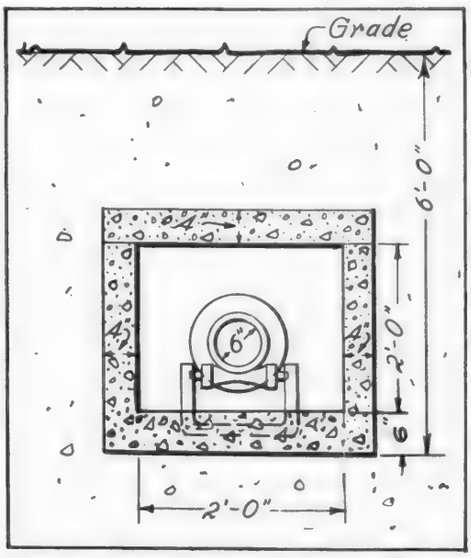


Fig. 2. Typical Section of Concrete Trench Carrying Steam Mains

one cellar to the next. The lines running along the streets are placed in concrete trenches (Fig. 2), supported on rollers carried on brackets set in the concrete bottom of the trench. Expansion joints of the double-slip type are installed every 200 ft., providing for expansion from both directions. Each expansion joint is anchored to a solid concrete block forming the bottom of the manhole, which is placed over every joint and carried up to grade where a cast-iron cover is provided.

The short branch-sections of the mains which extend, underground, between the houses, are protected by wooden conduit. In sections where the branches or mains have been run through unimproved property, split-tile conduit is used. The steam line is covered with 2-in., 85% magnesia pipe-covering over which is wound tar paper, wired on, and the whole then is pitched.

All of the larger-sized mains are welded except where flanged expansion joints or flanged fittings have to be used. In the latter cases manholes were placed to permit easy access to any trouble that might develop. The concrete trenches were arranged to drain to manholes at the low points where there are connections to the sewer. No condensation is returned to the plant, all trap discharges in the residences draining to the sewer.

CENTRAL PLANT

To supply steam for this system, a plant of unusually high character was designed and built at a cost of $60,000. The building itself is of rubble stone-work with brick trimmings, and has a brick stack 8 ft. in diameter and 125 ft. high. The boilers are placed in the main full-height room at one end of the building and at the other end are the offices.

(Continued on Page 78)

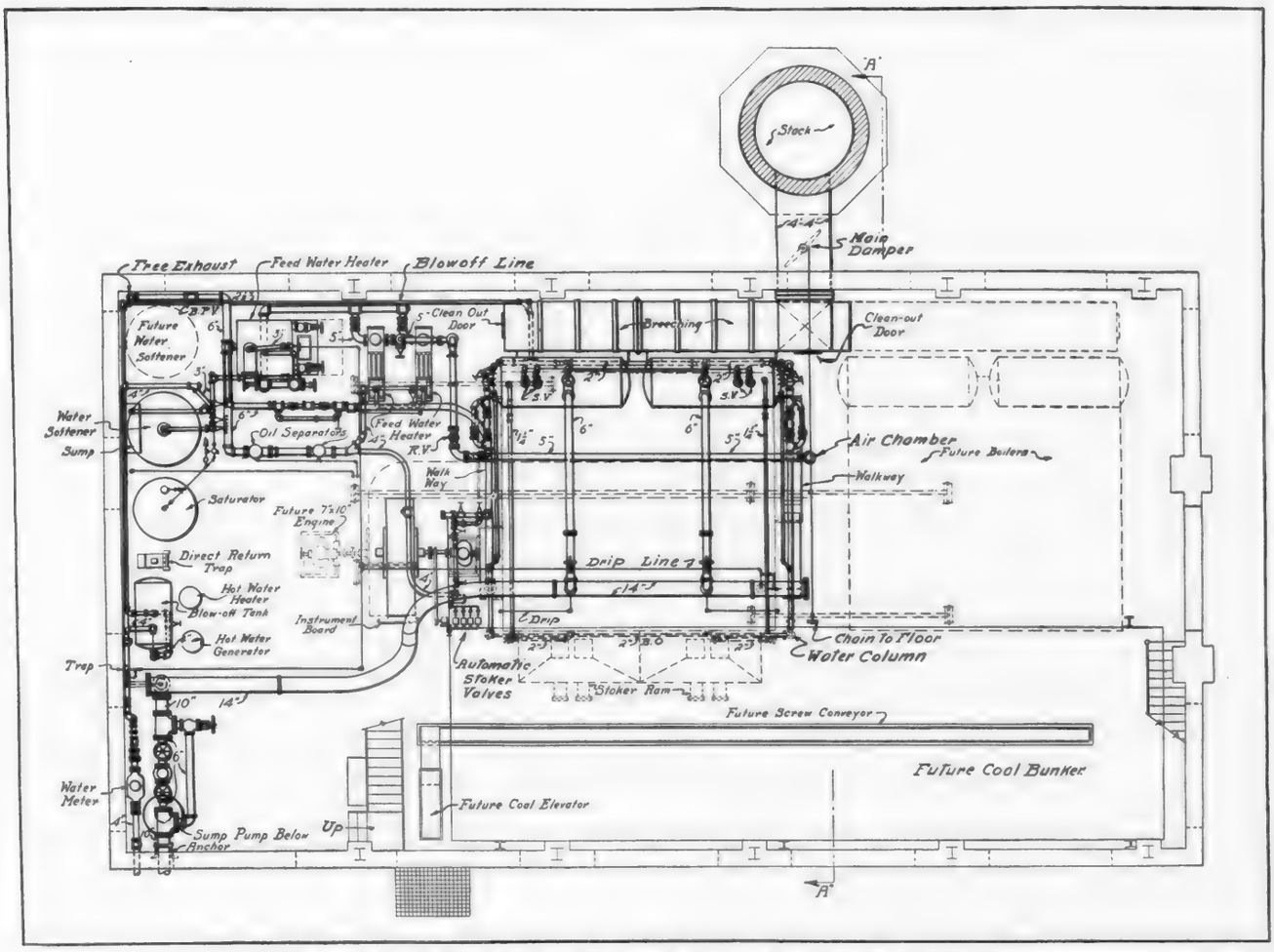
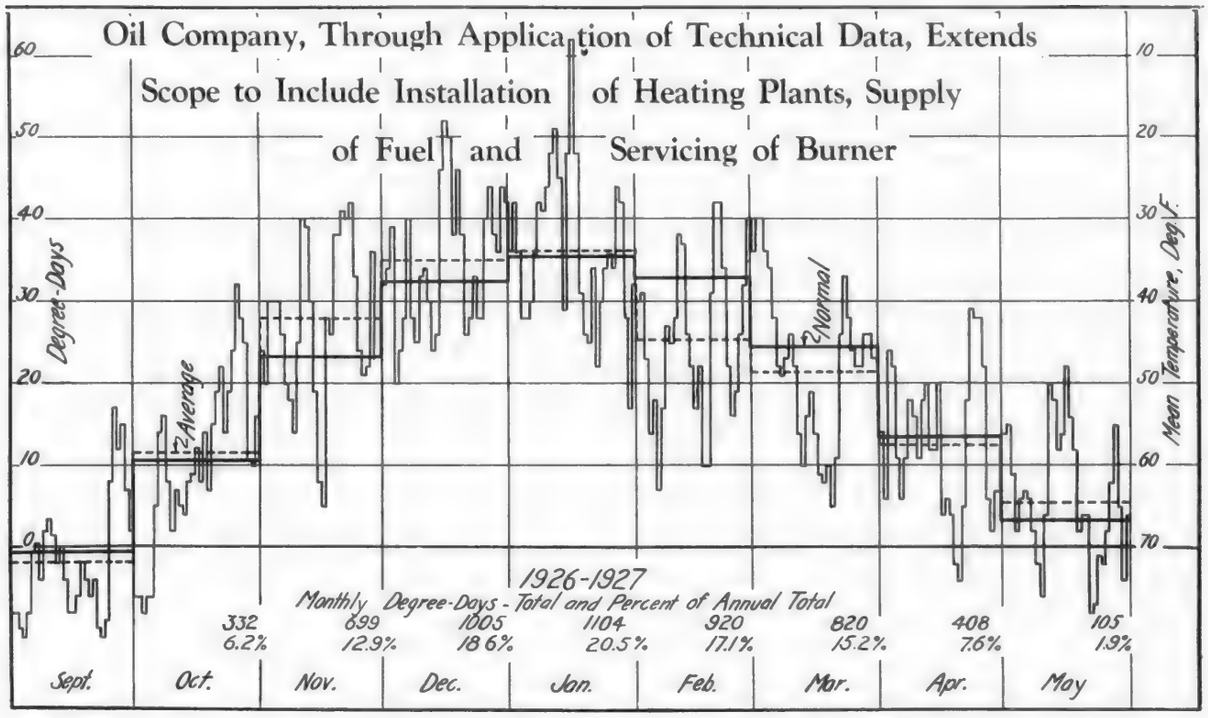


Fig. 3. Plan of Boiler Plant, Springfield Steam Company, Springfield, Pa.

Degree-Days Background Builds Business



By W. R. Abbott

THE company with which I am associated is engaged in the refining and marketing of various petroleum products, and one of our problems is the creation of a local fuel-oil market, and the subsequent permanent retention of the business so developed.*

Our first step was to engage in the sale, installation and servicing of oil burners, with particular attention to fully automatic domestic equipment.

After a survey has been made of existing or proposed heating equipment we recommend (in the event that conversion to oil is justified) such tankage, oil burners, control equipment, etc., as we have found, from our experience, to be most suitable. This recommendation is made in the form of a definite proposal covering not only a completed job, installed, but automatic operation and dependability. Night and day service is available, and, in the event that the customer chooses to purchase his fuel oil from us, this service is without charge. We obtain customers' permission to deliver fuel when and as needed, and assume full responsibility for the prevention of "empty tankage" service calls.

The result, from the customer's point of view, is that he actually is purchasing automatic heat, as free from care on his part as is his electric light, telephone, gas or water service. The result, from our point of view, is that we have developed a tank-wagon fuel-oil business which is of a more permanent nature than that of the average petroleum product marketed, and we have done so with a minimum of direct sales effort.

We first applied the degree-day method of fuel consumption analysis to the investigation of complaints as to excessive fuel costs. Later we used it in checking results obtained from various changes made to original installations for the purpose of lowering fuel costs. Then we applied it to checking efficiencies of oil-fired heating plants and, lastly, to the subject under discussion, fuel-oil deliveries.

The ideal in tank-truck delivery is: (1) Full tank-truck dumps; (2) complete freedom from idle or stand-by time; (3) continuous operation of rolling equipment. We must know, therefore, exactly when a customer's storage tank is down to the point that it will permit a full tank-truck dump, and we must know when it will be empty if the delivery is not made. The interval between these two is the time element of our delivery margin. Our procedure to obtain this information without periodical gauging of each and every tank is as follows: The daily mean temperature, obtained from the local Weather Bureau station, is used as the basis of our "dgeree-day log 'A.'" This virtually is a tabulation, made from day to day, showing the accumulated degree-days of heating load to date.

* The data underlying this article first were incorporated in a paper entitled "The Degree-Day Method of Fuel Consumption Analysis as Applied to Domestic Oil-Burner Fuel Deliveries," presented by W. R. Abbott at a meeting of the American Society of Mechanical Engineers, in New York, March 6, 1928.

It has been found that, *within the limits of our requirements,* the fuel consumption for a given heating plant is in direct proportion to the elapsed degree-days. A "job constant," which we term K, therefore, is obtained by dividing the fuel consumed in gallons, in any particular heating plant, by the degree-days which have elapsed during the period of use, and we find this to be a convenient expression of the fuel-consuming characteristics of this installation. This factor is worked out for every job each time a fuel delivery is made.

A customer's card "B" is made up for each installation and on this is entered the necessary information and calculations to obtain this job constant. Card "B" (see Page 78) is a continuous record of the fuel consumed on this particular job. The constant K is obtained by dividing the gallons consumed (Col. 10) by the elapsed degree-days (Col. 5) and is in terms of gallons per degree-day. In the next column is shown constant K_1, which is in terms of gallons per degree-day *per unit load.* The unit load is assumed to be 1000 sq. ft. of equivalent steam radiation. In the upper right hand corner of each card is entered the load on the boiler, together with this equivalent unit load, which is designated as "C." K_1 is determined by dividing K by the equivalent unit load "C."

The constant K_1 is unnecessary, as far as fuel deliveries are concerned, but is important as an index of the overall efficiency of the plant, and for comparing fuel consumption of plants which vary in size and manner of heat distribution. A study of the constant K_1 is of interest in evaluating the various types of building construction, insulation and weather stripping.

A comparison of the job constant K, with preceding ones, is an index of the efficiency of this particular installation during the period as compared with previous periods. Normally these job constants will vary only a few per cent from the seasonal constant, and abnormal variations are immediately reported to our service department. In this manner inefficient operation due to burner equipment getting out of adjustment is subject to correction before it has become serious from a fuel-consumption point of view, and the results of these corrective measures immediately become known in terms of gallons consumed per degree-day.

UTILIZATION of the degree-day method of predetermining fuel consumption as the foundation upon which to build a large and extraordinarily successful oil-fuel business, is the accomplishment of a midwestern sales engineer with a vision far beyond normal.

In its development, the plan became so ramified that the company, primarily organized to refine and merchandise petroleum products, now has assumed all of the prime functions of a heating contractor, save only the actual work of installing the heating plant and its oil burner. This extraordinary situation was not the result of premeditation but was due to the fact that the scheme, devised by W. R. Abbott, of the Aetna Oil Service Co., Louisville, Ky., like Topsy, "just growed." At the outset, the idea was to use the degree-day method of heat-load determination so that the company could make full-load tank-wagon deliveries, rather than follow the conventional practice of delivering oil in any quantity requested by the home-owner.

In the evolution of this plan, it was apparent that there were many extraneous factors limiting its successful prosecution, and it became necessary to take on functions not originally contemplated. As a result, the operations of this organization are closely analogous to those of a local gas utility, which literally makes a contract to supply "heating comfort" to its customers.

This company recommends and installs not one but several types and makes of oil burners, working out plans for each installation to the best interests of the customer. Again, working toward the same end, the company says in effect to the prospective builder of a home: "We will install for you only a heating plant that we are certain of; that we can guarantee, both in satisfactory performance and in fuel economy. This will not be a competitive job in the ordinary sense, because, in figuring on such a project, the heating contractor frequently skimps both in boiler and radiator size in order that he may be the lowest bidder. We propose to put in nothing under-size and to use no elements that will not harmonize to produce the desired results."

Results obtained from calculations on the individual installations are brought together in a third sheet designated as "Computation Sheet C," in which the status of fuel delivered, fuel available, consumption in gallons per degree-day, and other pertinent factors are tabulated. The last column in this tabulation is of course cumulative and represents, in terms of elapsed degree-days from the beginning of the heating season, the time when unit delivery can be made to each particular tank.

From this chart, then, it is known when any tank will be empty and when it can be filled. These vital statistics are transferred to wall chart "A," which is the graphic representation of the fuel delivery situation. It is posted each morning and is the sole source of information for the routing of truck deliveries.

Wall chart "A" is ruled vertically and horizontally. The horizontal lines represent installations, and the customer's name and address is inserted alphabetically at each end of the line, together with tankage and delivery zone. The vertical lines are elapsed degree-days from the beginning of the heating season and are to the scale of 100 degree-days per inch, with the zero at the left and 6000 degree-days at the right. The average heating load in our

territory is 5390 degree-days. A vertical guide is moved in a horizontal direction progressively from left to right each day, a distance equal to the degree-days corresponding to that day. Its position at any day during the heating season coincides exactly with the total elapsed degree-days. Its position in the drawing shown is for March and represents 4162 elapsed degree-days.

Deliveries and tank gaugings are posted daily on customers' cards "B," computed on sheet "C" and the results obtained are marked on this chart "A" in the following manner:

Centered in the horizontal space corresponding to the installation in question, a red pencil line is projected to the right and terminated at the degree-day point corresponding to "empty tank" conditions. A blue pencil line is drawn in a similar manner terminating at the degree-day point indicated, as the "fill point." This blue line covers and obliterates the red line underneath, so that the result is a blue line extending to the "fill point" and a red line marking the remainder of the space to the "empty point." When the traveling guide leaves a blue line, and is traversing its extension in red, that particular installation can be supplied with oil in a full tank-truck delivery, and the length of the red line is indicative of the margin which exists between "fill point" and "empty point."

TRUCK SCHEDULES MADE UP FROM CHART

With red and blue lines properly drawn opposite each installation, it is possible to determine, by inspection, every possible delivery. Knowing the round-trip delivery time for each installation, a schedule is worked out in advance for each tank and maximum economy in truck operation is facilitated.

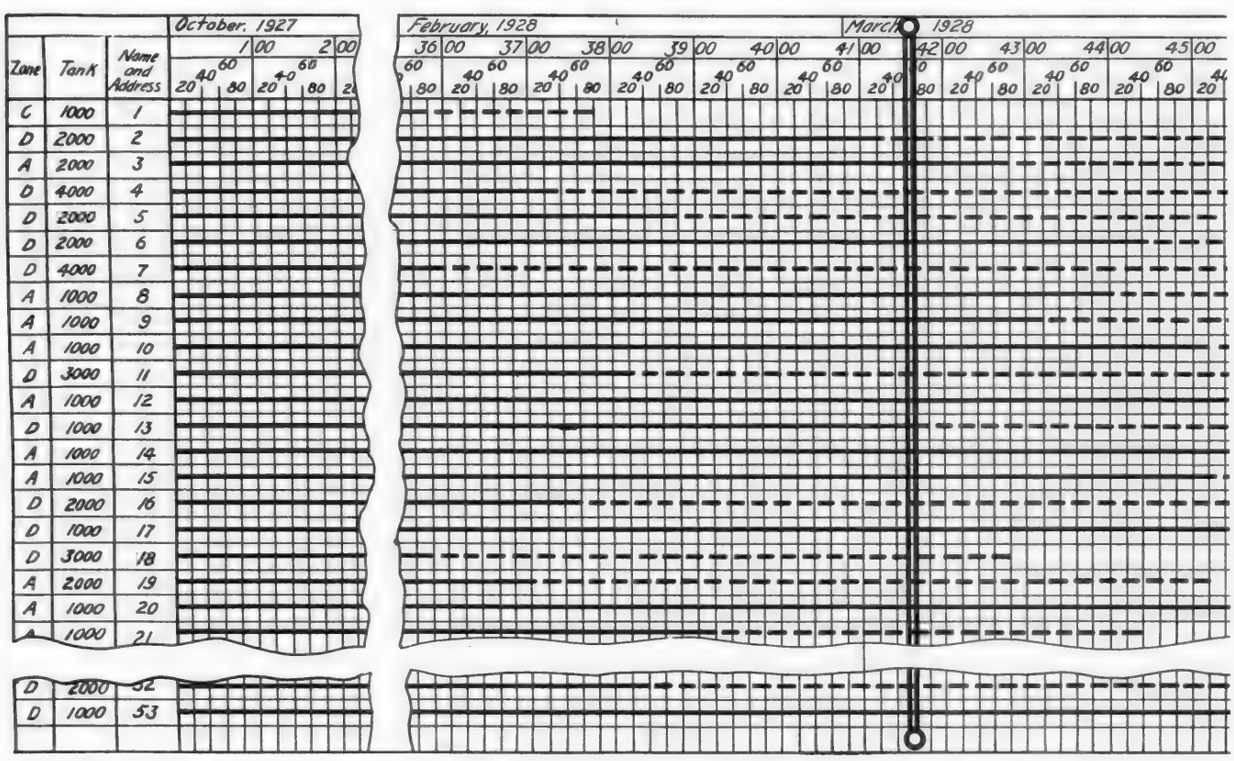
Chart "E" shows the heating load for a typical season, 1926-27, the light full line showing the actual daily conditions for this season, the heavy broken lines showing the monthly degree-days and the corresponding average mean temperatures for the season, and the heavy full line showing the monthly degree-days and average mean temperatures for the normal season, this being the average of 49 years of weather records.

Particularly at this part of the heating season (March) we are making every effort to regulate deliveries so that customer will have a minimum gallonage in storage on June 1, to carry through the summer season. An empty tank on that date is our goal, but we do not encourage broken tank-truck dumps to attain this end.

We arrange with our customers to fill their storage tanks at our convenience during the summer months so that the season starts with customers' tanks filled.

The following briefly outlines the various applications of the foregoing information:

Peak Fuel-Delivery Loads. The sum of all of the job constants K multiplied by the daily degree-day load gives us the total daily fuel consumption. Our deliveries must, of course, be geared up to the peak loads of December, January and February, and the information which we now have simplifies the problem of determining, at frequent intervals, the relation between total consumption and total deliveries. Knowing the summation of job constants K on in-



Wall Chart A Showing Graphic Methods of Determining When Full Tank-Truck

stallations already in service, and estimating the summation for the installations sold but not yet in operation, we can predict very closely the total gallonage for the season and, from chart "E," estimate the distribution of this gallonage by months. Tank truck equipment necessary to handle this business may be arranged for, and the necessary advance storage of fuel oil anticipated. In estimating the job constants K for installations not yet in service, we use as a basis the installed radiation, estimated equivalent unit load "C" and an assumed K_1.

Bulk Station Location. We have considerable suburban territory which is beyond the limits served by the local gas company. A large proportion of the homes located in this territory may be listed as good prospects for domestic oil-heating equipment. At the present time there is located in this area a considerable portion of our domestic oil fuel business, and it so happens that, in order to make these deliveries, the trucks have to traverse downtown streets subject to serious traffic congestion during business hours.

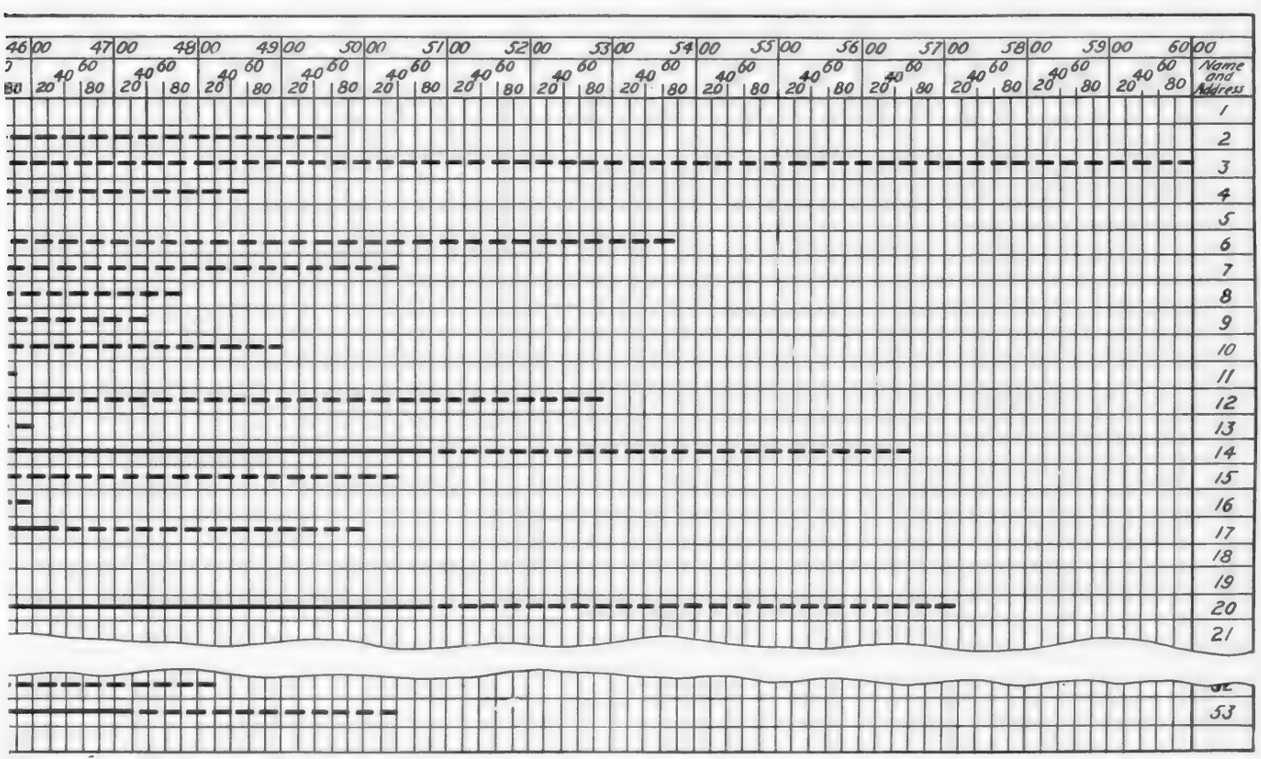
We propose to install bulk storage as near as possible to the "center of gallonage" of the area referred to. From this storage we will operate delivery trucks of 700 gal. capacity. (The 700-gal. limitation is due to limit loadings on private drives.) To this storage we will deliver in maximum-capacity tank trucks during the hours which are free from city traffic delays. On our installation map is located accurately every job. The area in question is outlined and each job constant K is inserted in a circle representing its location geographically. The sum of the job constants multiplied by the yearly average degree-days, 5390, is the storage, in gallons, to be arranged for. Its fluctuation during the year can be obtained from chart "E" and the "center of gallonage" or theoretically perfect location of bulk storage computed as a 'moment' problem, the factors involved being K (gallons per degree-day) and distance (in miles). The estimated future business must, of course, be taken into consideration in this survey.

HOUSE HEATING AND DOMESTIC WATER HEATING

In our installations beyond the gas service areas, we automatically heat the domestic water as well as the residence, and generally with the same oil-burner equipment. This domestic water-heating load is fairly constant and does not fluctuate materially with the outside temperature. The job constant K then must be separated into two parts, one, a domestic, hot-water factor, which is constant, and the other, a heating factor, which fluctuates with the outside mean temperature. The former is determined during the summer time when there is no heating load and is in terms of gallons per day. This quantity multiplied by the days in the period in question gives a quantity which must be subtracted from the gallons consumed, as computed in Col. 10, card "B." The job constant K then found by dividing the entry in Col. 10 by the entry in Col. 5 is for the heating load only. In other words, we are able at all times to make a separation in the fuel consumed with an accuracy within the limits of our requirements.

The whole scheme of operation is capitalized in sales work in the following manner:

(1) The prospect is offered an opportunity to purchase automatic heat and not just an oil burner.



Deliveries of Oil Fuel Can Be Made to Each Customer

Installation No. 10		45 Prospect Ave.			Tankage 1000 Gal. 48"D × 10'-8"							Hot Water 1017 D.D. Equiv. Steam 708 D.D. Equiv. Unit Load C=0.71
Degree-Days					Gallons					Gal. per D-D		
From		To		Elapsed	Gauge 1st Date	Deliveries	Total	Gauge 2nd Date	Consumption	Job Const. K	Job Const. K_1	
Date	D-D	Date	D-D	D-D								
9/13/27	0	10/31/27	339	339	923	0	923	422	501	1.48	2.08	High-Notified S.O. 11/1
10/31	339	11/8	534	195	422	500	922	870	52	.27	-	Short Period
11/8	534	12/9	1268	734	870	600	1470	760	710	.97	1.37	High-Notified S.O. 12/10
12/9	1268	12/28	1906	638	760	700	1460	850	610	.96	1.35	
12/28	1906	1/12/28	2466	560	850	685	1535	1000	535	.96	1.35	
1/12/28	2466	1/28	2967	501	1000	200	1200	712	488	.97	1.37	
1/28	2967	2/10	3402	435	712	468	1380	819	361	.83	1.17	
2/10	3402	2/29	4088	686	819	375	1194	651	543	.79	1.11	
1	2	3	4	5	6	7	8	9	10	11	12	Column Number
A-4		A-4		(2-4)	Deliv. Ticket		(6+7)	Del. Tick.	(8-9)	10÷5	11÷6	From

Customer's Card B Showing Record of Deliveries and Determination of Job Constants K and K_1

(2) There is an undivided responsibility resulting from a single organization installing the equipment, servicing same, and supplying the fuel which we find works best in each particular burner. (3) The prospect is rather well protected from the hazard of purchasing what might later become "orphan" equipment. (4) Our service organization is financed through the saving effected in direct fuel-oil sales effort. In other words, we operate our service department for what it would cost us to sell this fuel oil by means of salesmen and advertising. In self-protection we must keep this service cost as low as possible, and in so doing the customer is certain to receive a quality installation both as to material and workmanship. For the same reason we must be very particular in regard to the uniformity and specifications of the fuel supplied.

This degree-day method of fuel consumption analysis has its limitations, and what has been outlined may be subject to criticism from a pure engineering standpoint. Within the limits of our requirements, however, this method gives entirely satisfactory results and is easily understood by the layman and by our operating personnel.

The Status of District Heating

(*Continued from Page* 73)

Two 300 B.H.P. Keeler cross-drum water-tube steel boilers are designed to operate at 200% of rating and each is fitted with a Jones twin-retort, side-dump underfeed stoker with steam ram.

Forced draft is furnished by a Clarage fan flexibly coupled to a Troy vertical engine, with Mason fan regulator in the steam supply line. A 3000 H.P. Cochrane metering, feed-water heater has a peak capacity of 100,000 lbs. of water per hour.

Bituminous coal is burned, with forced draft, in underfeed stokers set beneath water-tube boilers; there ultimately will be an overhead coal bunker with a weigh-larry feed to the stoker hoppers. Space has been left for the addition of future boilers when required. The operating pressure of the boilers is 100 lbs. Boiler feed-pumps are of the simplex steam-driven piston-pattern type, installed in duplicate and cross connected, working in conjunction with feed-water regulators. There also is installed a water softener. Supply water is taken from a driven well.

Steam is carried from the boiler nozzles, as shown in Fig. 3, through inverted "U" bends and delivered into the top of the boiler header, this main header drops from the tops of the boilers in a compound bend to the space under the floor of the office section. Here branches are taken off through pressure-reducing valves to the mains which will supply steam to the different sections of territory into which pipes have been extended.

Standard-weight valves and fittings are employed on all steam lines carrying boiler pressure, and extra-heavy valves and fittings are used on the boiler feed lines between the discharge outlet on boiler-feed pumps and boiler-feed water inlet.

This is the fourth of a series of articles on district steam heating. Future articles will appear from time to time, discussing the progress made in different parts of the country in this branch of the heating industry.

Dynamic Significance of Static Pressure

Part II—The Quantitative Relation Between Fluid Velocity and Fluid Pressure

By Dr. George De Bothezat

WE have, in the foregoing,* without the use of mathematics, established the qualitative relation between fluid velocity and fluid pressure. But, to establish the quantitative relationship, a little mathematics will be unavoidable, because mathematical language is the language of quantitative relations par excellence.

In order to clearly understand the quantitative relation between fluid velocity and fluid pressure, we must take an important step in our conception of pressure.

So far we have thought of pressure, as, say, the pressure of so many pounds per square foot or per square inch. But now we must begin to think of pressure as being the *potential mechanical energy stored in every unit of volume of the fluid under consideration;* this under the limitation, above stated, of negligible compressibility.

Here is the mathematical proof of this fundamental fact—those who are not able to follow the proof in all its details, can take our assertion for granted, especially as this meaning of pressure will become quite clear from the examples that follow.

Let us consider a volume v_o of air under atmospheric pressure, p_o, inclosed in a cylinder covered by a piston, as represented in Fig. 5. When neglecting gravitational effects, unessential for our purpose, the pressure p_o, will be uniformly distributed throughout the fluid. Let us designate the area of the cross section of the cylinder by S, and its height by H. Now let us assume that the pressure varies and becomes $p_o + p$ where p is a small positive or negative pressure variation, counted from atmospheric pressure. This small variation of pressure will have, as a result, a small variation of the fluid volume v_o. The piston will sink, and the height H will become H—h, where h is a small decrease of H. When we say that p and h are both small, we mean that *their product is negligible.*

The work, w, done by the pressure $(p_o + p)$ distributed over the area S during the sinking of the piston through the distance L will be equal to:

(1) $w = h \times S\ (p_o + p) = Shp_o + Shp \cong Shp_o$

as we can neglect Shp for reasons above stated. Considering the case of isothermic phenomena, that is, neglecting temperature variations, we can apply the Boyle-Mariotte law to our air volume. We thus can write that the product of the volume and the pressure is the same before and after the air volume v_o undergoes the small variation Sh. Thus:

$$p_o v_o = (p_o + p)\ (v_o - Sh)$$
$$= p_o v_o - p_o Sh + p v_o - Shp$$

or again neglecting Shp, we find

(2) $$w = Shp_o = pv_o$$

Comparing this last relation to the relation (1) we immediately see that the work stored in the air volume v_o due to its negligible variation Sh produced by the pressure $(p_o + p)$ is equal to pv_o. The energy stored per unit of volume thus is equal to p. The pressure p, that is, the excess or the deficiency of pressure over the atmospheric pressure, thus does appear to be equal to the energy stored per unit of volume. That this energy w has been stored in the volume v_o is clear if one imagines the pressure $(p_o + p)$ decreasing again to its original value p_o; then the air volume will slightly expand, pushing the piston back to its original position and the energy w will be released by this slight expansion. The air behaves, in this case, as a stiff spring which for very small deformations can store appreciable amounts of work and release this work when permitted to expand slightly. Thus this storing or releasing of energy, depending on whether p is positive or negative, takes place in the shape of a slight compression or expansion which, within the limits of our statement of the problem, is negligible. That is, the density variation of the air is negligible, but the storing of energy due to pressure variation in it is not negligible and the pressure p is proportional to the energy stored per unit of air volume.

Having established the fact that the pressure p is equivalent to the energy stored in every unit of volume of an air mass under the pressure p, it becomes quite easy to find the quantitative relation between fluid velocity and pressure inside the air mass. To achieve this we simply will have to apply the general law of the conservation of energy.

What are the energies involved in the motion of a fluid particle? If we neglect gravitational effects, which are immaterial for our purpose, then the only two energies involved in our phenomenon of air flow will be:

1. The kinetic energy of the air particle, the value of which, for every unit of volume, is:

$$\frac{\delta v^2}{2}$$

δ being the density, that is, the mass of every unit of volume.

*See Part I, in THE HEATING AND VENTILATING MAGAZINE, for May, 1928, Page 65.

2. The energy stored in every unit of air volume in the shape of the pressure p. Thus the total amount of energy, which we will designate by E, contained in every unit of volume of our air mass is equal to:

$$E = p + \frac{\delta v^2}{2}$$

As long as no energy will be delivered to or taken away from the air mass under consideration, the energy E will remain constant.

The above relation constitutes the famous and fundamental *Bernoulli law* which fixes the quantitative relation between the pressure p and velocity v inside an air mass under the conditions of negligible density variation at every point where the energy E has the same value.

We now will suggest a few applications of this remarkable law which will fully illustrate its far-reaching meaning.

FLOW OF AIR IN DUCTS

Suppose we have air flowing in a duct of the shape represented in Fig. 6. Also let us assume the friction of the air against the walls in a short section of the duct, between the section S_1 and S_2 to be negligible and the turbulence of the flow also to be negligible. It is not so in practice, but to show the actual meaning of the Bernouilli law, we want to make a first application of it under ideal conditions. Also let us assume that S_1 is twice as large as S_2. Under such conditions the velocity v_1 in the section S_1 will be one-half the velocity v_2 in the section S_2. We thus will have

$$v_2 = 2v_1$$

Call p_1 the pressure—measured from atmospheric pressure—in the section S_1 and p_2 the pressure in the section S_2. Under our ideal conditions the energy per unit of air volume, in the sections S_1 and S_2 will be the same, and thus we will have

$$E = p_1 + \frac{\delta v_1^2}{2} = p_2 + \frac{\delta v_2^2}{2}$$

$$p_2 = p_1 + \frac{\delta}{2}(v_1^2 - v_2^2) = p_1 - 3/2\ \delta v_1^2$$

Knowing the pressure p_1 and velocity v_1 in the section S_1, we will be able to compute the pressure p_2 in the section S_2. We see that the pressure p_2 is smaller than the pressure p_1, by the amount $3/2\ \delta v_1^2$.

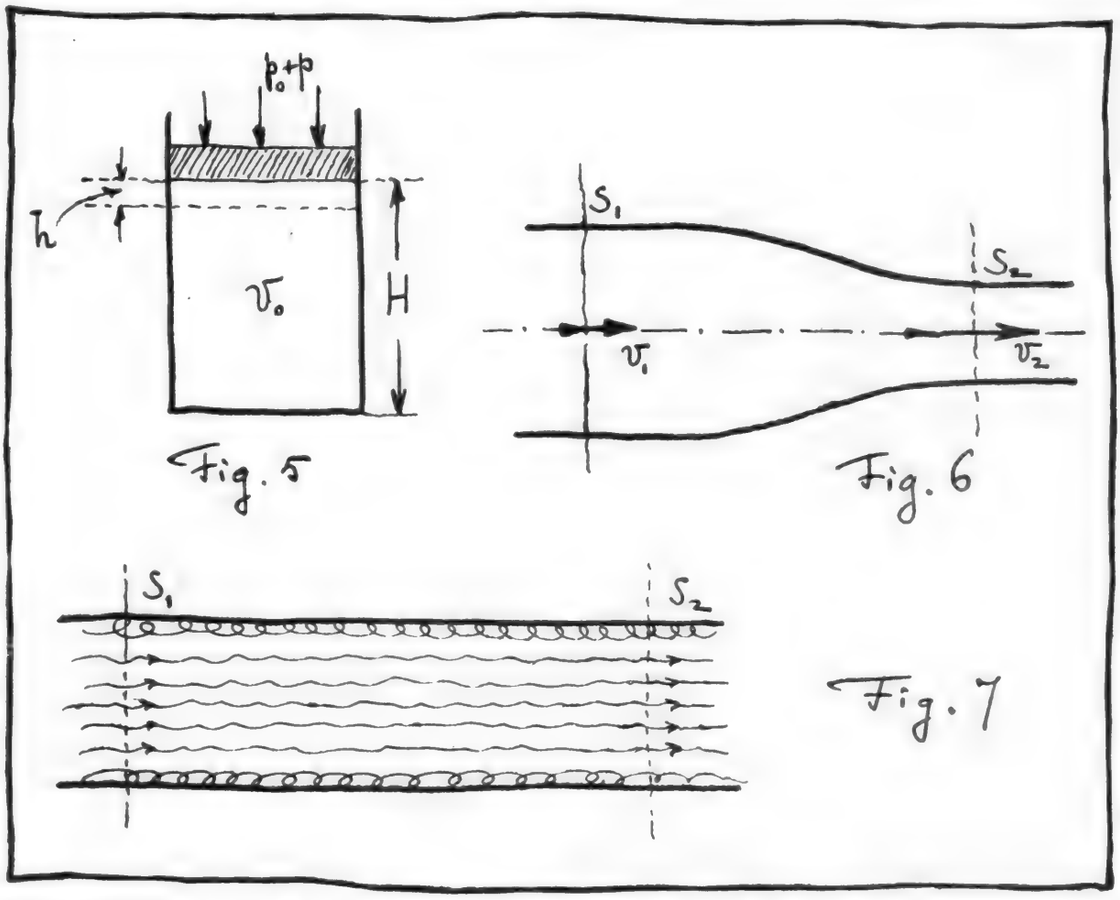
If, in the section S_1, we have atmospheric pressure, then we will have $p_1 = 0$ and thus

$$p_2 = -3/2\ \delta v_1^2$$

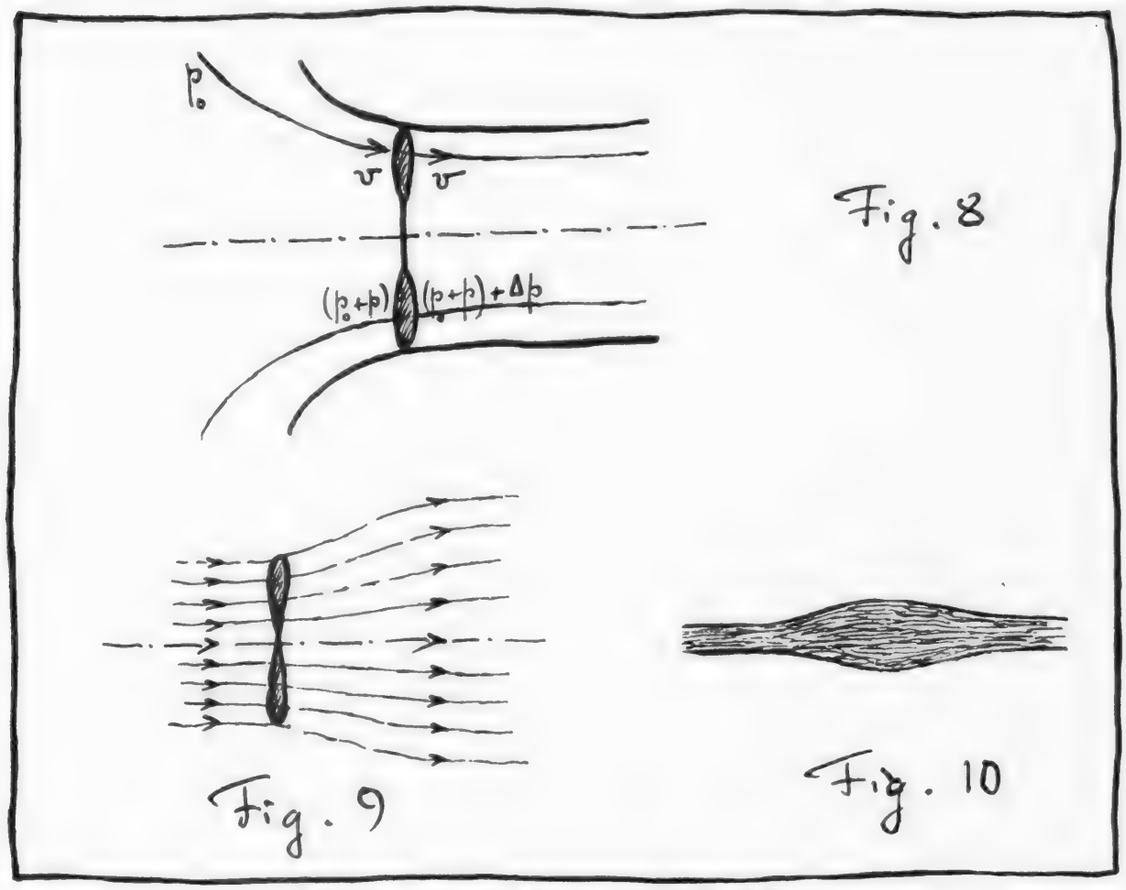
Thus we will have, in section S_2, a pressure smaller than the atmospheric pressure.

To make a numerical application, let $v_1 = 100$ ft. per sec. (which corresponds to the range of airplane velocities). Then, with $\delta = 0.00238$ we will find

$p_2 = -3/2 \times 0.00238 \times 100^2 = 35.8$ lbs. per ft.^{2} or, approximately $p_2 \cong 6.9$ in. of water column.



Sketches Illustrating Relation Between Fluid Velocity and Fluid Pressure



Sketches Illustrating Flow of Air Through Fans

We will leave it as an exercise to the reader to recompute the pressure in pounds per square foot into inches of water column.

If we should make a hole in the duct, in the neighborhood of the section S_2, air would be sucked into the pipe through this hole on account of the pressure being lower than the atmospheric pressure. For those unexperienced with flow phenomena, it will probably, at first sight, appear that it is just the opposite that should take place.

Let us now consider an actual cylindrical duct, with wall friction and the air flowing in it with a certain amount of flow irregularities, as is actually the case in practice.

Let us consider two sections S_1 and S_2 in such a duct, Fig. 7. If there are no sharp bends in the neighborhood of the sections S_1 and S_2, and if the flow velocity is not excessive, the flowing air will fill the duct and, the same amount of air passing through the sections S_1 and S_2, the air velocities v_1 and v_2 in S_1 and S_2 will be substantially the same. Now, on account of the friction of the walls, the viscosity of the air and small irregularities of the flow a loss of energy will be assumed to take place between the sections S_1 and S_2. That is, the energy per unit of volume E_1 in section S_1 will be smaller than the energy E_2 in the section S_2. Thus we will have

$$E_2 < E_1$$

$$\text{But as } E_1 = p_1 + \frac{\delta v_1^2}{2}$$

$$\text{and } E_2 = p_2 + \frac{\delta v_2^2}{2} = p_2 + \frac{\delta v_1^2}{2}$$

on account of $v_1 = v_2$, it follows that we will have

$$p_2 < p_1$$

That is, the loss of energy in the duct, due to viscosity and turbulence, will have, as a consequence, a *drop of pressure in the direction of the flow;* this because the flow velocity can not change when the duct section remains the same and the air flow fills the duct.

The same thing will happen when the air flow passes around a bend, the duct section remaining the same before and after the bend. As a loss of energy will take place in the bend, and as the velocity will remain substantially the same, after and before the bend, as long as the air flow fills the duct, it is the pressure that will drop due to passing the bend.

One thus will readily understand why pressure (static pressure) is necessary to secure the flow of air in ducts.

AIR FLOW THROUGH A FAN

Now consider a disc fan blowing air into a duct, Fig. 8. Call $p_o + p$ and v the air pressure and air velocity right in front of the fan.

At a sufficient distance from the fan, on the side from which air is being drawn, the pressure will be equal to the atmospheric pressure p_o and the air will not as yet have acquired an appreciable velo-

city. As the air flowing from where the pressure is p_o towards the fan where, right in front, the pressure is $p_o + p$, will not have sustained any important energy loss, because there are no other grounds for such losses but viscosity and a slight flow-turbulence which are negligible in front of the fan, the energy per unit of volume will thus remain substantially the same in front of the fan. Applying the Bernouilli law we will thus have

$$p_o = (p_o + p) + \frac{\delta v^2}{2}$$

$$\text{or } p = -\frac{\delta v^2}{2}$$

The pressure right in front of the fan thus will be lower than the atmospheric pressure.

Consider, then, what will happen when the air goes through the fan blades. As the area of the section for the air flow is substantially the same in front and behind the fan, the air velocity will not change when crossing the fan. But as the fan *communicates energy to the air crossing it,* the energy E per unit of volume must increase and, as the velocity does not change, *it is the pressure that will increase.* Let us call the increase of pressure sustained by the air when crossing a fan *pressure step,* and designate it by $\triangle p$. The energy, per unit of volume, in front of the fan thus is equal to

$$p + \frac{\delta v^2}{2}$$

and right behind the fan it becomes

$$p + \triangle p + \frac{\delta v^2}{2}$$

One now can see how different are the real physical conditions of operation of a fan from the non-analytical understanding of its operation. It generally is thought that velocity is communicated to the air by the direct impact of the fan blades against the air. We now see that it is not so. The air acquires all its velocity *in front of the fan,* before coming in contact with the fan blades, *due to the decrease of pressure* (or, if you prefer, the suction) *created in front of the fan.* When crossing the fan, the air velocity is not altered; it is only the pressure that is increased.*

When now does a disc fan furnish static pressure? As we have seen, the excess of pressure behind the fan above the atmospheric pressure is equal to

$$p + \triangle p$$

but, as $p = -1/2\ \delta v^2$, we have, calling this excess of pressure p_s, it is just the static pressure

$$p_s = \triangle p - \frac{\delta v^2}{2}$$

When the fan furnishes static pressure, p_s will be positive; that is, $\triangle p > \frac{\delta v^2}{2}$. High static pressure means high value of p_s. Thus we see that, in order to produce disc fans with high static pressure, they must be so designed as to furnish comparatively large pressure steps, $\triangle p$, for comparatively low-flow velocities through the fan. It is the difficulty of realizing such conditions that makes so baffling the design of disc fans able to furnish static pressure. But, when all conditions of the problem are well understood, it is quite possible to produce such fans. Some disc fans, not designed with an understanding of the conditions here explained, not only do not furnish positive values of p_s behind the fan, but even operate with negative values of p_s behind the fan. That is, the pressure behind the fan is lower than the atmospheric pressure. That is why such disc fans are unable to operate in ducts.

*When the air crosses a fan the blades also communicate to it a rotational motion. For fans of high efficiency this air rotation is slight and it is soon dissipated through air viscosity.

AIR FLOW THROUGH A WIND MILL

In Fig. 9 is schematically represented a wind mill disposed in an air current, of velocity v, and pressure p right in front of the mill. When crossing the blades of the mill, right back of it, the air velocity will remain substantially constant, because the general air-flow cross-section can not materially change in such a short distance. But the pressure will materially drop *because the mill absorbs energy from the air.* After having passed the mill, the air velocity will first drop, in order to permit the pressure to rise. The flow will thus expand behind the mill. It is only at a certain distance behind the mill that the air mass, that has passed through it, will again, due to air viscosity, attain the wind velocity of the surrounding space.

I would suggest that the reader think over carefully the three typical cases of air flow above discussed:

1. Air flow without any energy loss, E remaining constant. The relation between pressure and velocity is fixed by the *Bernouilli law.*

$$p + \frac{\delta v^2}{2} = \text{const}$$

2. Air flow with energy communicated to the air, a typical case of which is the air flow through a fan.

3. Air flow with energy taken away from the air. Typical cases are flow in air ducts and flow through a wind mill.

THE ANEURISM

The Bernouilli law is of such far-reaching importance that an almost endless number of its applications could be given. I want to discuss briefly a case of its application, totally outside of our ventilation field, which will show under what diversified conditions the Bernouilli law can give us most valuable information.

There is a very dangerous disease called aneurism. It consists in the fact, that, due to diseased conditions, the walls of a blood vessel weaken in a certain spot and become unable to hold the blood pressure. Under such conditions, the

blood pressure produces a dilation of the walls of the blood vessel, and the blood vessel, originally cylindrical, takes the shape schematically represented in Fig. 10. What happens after such swelling of the walls of the blood vessel? As, in the swollen section, the cross section available for the flow of blood has increased, the blood velocity will there decrease. But if the velocity will decrease the blood pressure will rise in this very same spot. Thus the diseased spot, that already was not fit to hold the normal blood pressure, will have to stand still higher blood pressures as soon as the swelling has started. This is why when an aneurism starts, its further very rapid development and fatal result is nothing but a direct consequence of the Bernouilli law.

It is not without interest to note that, in this case, the development of the disease is governed mainly by purely hydrodynamic conditions.

Heating and Ventilation of a Large Garage

(*Continued from Page 71*)

most economical if limited to the least possible number of units.

Located at the Clinton Street entrance, on the mezzanine, above the office, one unit takes air from the open filling-station space, about 10 ft. above the grade. Three stacks of Vento heaters, in two units, are used as a heating element, giving a final temperature of 76° F., taking all outside air at —10° F. Two No. 3½ fans, each with a capacity of 30,000 cu. ft. of air per minute are used to force this air directly from their outlets into the main portion of the first-floor garage area. These units are on a common shaft, and are belt-driven by a motor of 15 H.P.

Greasing pits, which are located on the north side of the building at the Clinton Street entrance, have a separate exhaust system, located in the pits, of 5000 cu. ft. per minute capacity, using a No. 1½ fan, belt-driven by a 1½ H.P. motor. The exhaust from this fan is taken to the roof.

The main exhaust system for this floor uses a concrete duct, 75 ft. long, on each side of the building. From this a sheet-metal duct is taken along the ceiling, between the beams, to a fan located on the second floor, which exhausts the air through the roof, or, by means of a damper, recirculates the air to the second floor. This unit has a capacity of 40,000 cu. ft. per minute and is a No. 4 fan belt-driven by a 10 H.P. motor. It is located in a separate brick-lined room and is entirely separated from the second floor, except by a fireproof damper, which is opened for recirculation when desired.

SECOND FLOOR SYSTEM

On the second floor, due to space conditions, it was necessary to use two supply units, each of 30,000 cu. ft. per minute capacity. One of these units is located near the north side of the building. Air is taken from the open filling station at the Canal Street end, through three stacks of Vento heaters, and is forced directly into the room by a No. 3½ fan, belt-driven by a 7½ H.P. motor. The other unit, located on the south side of the building, and of the same capacity, takes air from the south alley, 10 ft. above grade, and injects it directly into the room.

For this floor the exhaust unit is located on the first-floor mezzanine, at the Clinton Street end, and draws air through a grating in the floor. Exhaust is into the alley, 10 ft. above grade. This unit is entirely separated from the first floor by concrete walls, and has a fireproof recirculating damper that will allow air to be ejected into the first floor when recirculation is required. Having a capacity of 45,000 cu. ft. per minute this unit is a No. 4 fan, belt-driven by a 10 H.P. motor.

RECIRCULATION AVAILABLE WHEN DESIRED

All supply units are arranged for recirculation by means of louvre dampers, chain operated. When full recirculation is in operation, two floors act as a unit, exhaust from the second floor being ejected in the first floor and exhaust from the first floor being passed to the second floor, while fresh air intakes are closed and the recirculating dampers open on the supply units, creating a semi-balance on the two floors.

Motors used are manufactured by the Louis-Allis Co., Milwaukee, Wis., and are capable of 20% increase in revolutions through field control by means of Cutler-Hammer controllers. Due to space conditions, Tentacular belts are used.

It might seem that there would be some unheated spots in this building, but the results show that this is not the case. A careful check was made of temperature conditions inside of the building during the severest part of last winter, and results showed a fairly even temperature throughout the entire building, under various wind conditions. While no chemical tests were made, the management of this garage claims that the building apparently is free from carbon monoxide gas. None of the employees has complained of effects of this gas at any time, and even the greasing pits are kept free.

The architect was Davis D. Meredith, of Chicago, Ill.; general contractors were R. G. Wieboldt & Company; the ventilating contractor, the Reliable Sheet Metal Works, and the heating contractor, the Arcase Steam Heating Company.

As other floors are added, it is the intention of the architect to adopt a similar system, coupling them together in the same manner as the first and second floors are coupled. The fifth floor, which will not require ventilation because skylights can be installed, will be heated by floor-type unit heaters.

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AROUSED by the fact that millions of home-owners are buying automobiles, radios, vacuum cleaners, and similar goods coming under the general heading of luxuries, without spending anything like a proportionate amount for heating equipment, the heating contractor now realizes that perforce he must become an agressive merchandiser and join the army of doorbell pullers, or hook up with an adequate merchandising scheme, developed by the manufacturer, if he is to get his fair share of the public's dollar.

In a recent survey, conducted by a leading manufacturer, it was found, among other things, that there are approximately 1,000,000 homes supplied yearly with heating apparatus, of which only about 300,000 are being equipped with radiator heat. In the replacement field there now exist 17,000,000 homes in America which do not have radiator heat. It was found further that the common conception of the cost of radiator heating for a six or eight-room house is not less than $1000, instead of half that amount, and, finally, that home-owners are unaware of the opportunities open to them for purchasing such equipment on easy-payment plans, or through their local building and loan association, co-operative bank or other organizations.

In Chicago, the situation was met in an interesting manner by the local heating contractors' association, whose activities in uncovering the market for replacement jobs is told on another page of this issue.

It has remained, however, for the manufacturing side of the industry to formulate a plan (which, by the way, is confined to replacement work), national in scope, and one calculated "to promote radiator heating consciousness in the public mind, to explain the benefits of radiator heating, to remove the obstacles that stand in the way of its universal adoption, to give home-buyers and home-owners some idea of the cost of radiator heating, and tell them how easily the money can be obtained for its installation and the convenient terms of payment that may be arranged."

How far-reaching and carefully-thought-out is this particular plan may be gauged from the fact that, in addition to financing the home-owner through a heating and plumbing finance corporation, the manufacturer has provided for complete territorial coverage through the establishment of independent stores throughout the country. Each store is in charge of a trained salesman whose duties involve those so long neglected by the average heating contractor and tersely expressed by the term "doorbell ringer." He is described as the heating contractor's greatest asset because all of the radiator business he develops is turned over to the local heating contractors. Through his activities in uncovering new business in old homes he is filling the gap between the merchandising methods of the average heating contractor and those of the modern household equipment dealer. Needless to say, every means is provided to enable local heating contractors to tie up with the plan.

IN view of some misunderstandings which have arisen among heating contractors regarding this particular house-to-house selling plan, the manufacturers take pains to explain that they pledge themselves "to keep inviolate the long-established channels for the distribution and installation of our radiator heating products," adding that "we recognize wholesalers as the proper distributors of these products and the heating contractor as the only authentic medium through whom the public shall secure these products and the installation thereof."

Nothing like the plan here outlined, either in daring or scope, has ever before been essayed in the heating industry. Its success, as its promoter suggests, will enable the heating contractor to enter a new era of opportunity and prosperity, quite irrespective of any lag in the general construction program.

Heating and Ventilation Equipment for a Kitchenette Hotel

Oman and Lilienthal, Architects
St. Clair Hotel, Chicago

ONE of the new hostelries in Chicago is the St. Clair Hotel, combining conventional accommodations for transients, with eleven floors of kitchenette apartments of one to three rooms.

Approximately 100 ft. square, the building is 20 stories high; it is of steel and concrete fireproof construction, with a brick and terra cotta exterior. The ground floor contains a large lobby, main dining room, private dining rooms, coffee shop, kitchens, general offices and three stores. On the second floor are five shops, writing room, convention room and lounging alcoves. Above this, on the third to the ninth floors, inclusive, are located 189 hotel rooms, each with bath. The tenth to the twentieth floors are given up to the kitchenette apartments.

This building is distinctly for high-class occupancy and is equipped with every modern convenience, among which might be mentioned mechanical refrigeration for the apartments, circulating ice water for the hotel rooms, mechanical ventilation, oil-burning equipment for the boilers, and separate passenger and service elevators. Each apartment is also supplied with in-a-door beds.

For the heating of this modern hostelry the Dunham vacuum system, with a fixed differential maintained between the steam and return lines, was selected as most nearly meeting the requirements.

The steam supply is furnished by an overhead downfeed system of piping which supplies steam to all radiators on the floors above the second floor. This overhead downfeed system is supplied by a main 10-in. riser direct from the boiler room, while the radiators located on the basement, first and second floors, are supplied from a separate system.

The radiators throughout the building are of the Corto type, with runouts made below the floor or in the walls. Each radiator is equipped with a Dunham packless radiator valve, with orifice plate, and a radiator trap designed to handle pressures from 25 in. of vacuum to 25 lbs. pressure.

IN THE BOILER-ROOM

In the boiler-room (Fig. 1) are two Kewanee low-pressure downdraft portable boilers, each with 2074 sq. ft. of heating surface and 41.7 sq. ft. of grate area.

In each smoke uptake is placed an Eclipse smoke indicator, located near the damper and supplied with heavy sheet-iron sight box, piping light box and reflector, arranged for smoke inspection from the front of the boilers.

BOILER-ROOM PIPING

Referring to Fig. 1, it will be noted that the steam header for the boilers is 12 in. in size and that each boiler feeds into this header through a 10-in. connection, with a 10-in. angle valve in the branch; from the header an 8-in. connection is taken to supply steam to the two service water heaters, this branch splitting into two 6-in. pipes, each of which is valved and connected to the steam inlet of the heaters.

Beyond this the main reduces to 10 in. in size and has two reducing valves connected in parallel. Immediately beyond this point on the main, a 4½-in. branch is taken off to supply the lower floors. After supplying this branch, a main 10-in. gate valve is introduced to control the rest of the line which feeds the main 10-in. riser going to the top of the building and supplying all the upper floors. The return piping is shown on this plan only as far as the boilers, but all return connections around the boilers have been omitted, as they are shown in detail in Fig. 2. All piping is covered with 1-in. 4-ply air cell asbestos.

RETURN CONNECTIONS AND VACUUM PUMPS

In Fig. 2 is indicated the return-pipe arrangement around the vacuum pumps, as well as the feed lines to the boilers; it will be noted that the main 4-in. return line has been hooked up to each of two receivers or accumulators, as they are termed, with a 3-in. branch to each, the branches being equipped with valves and strainers. Into the opposite end of this return header is connected the returns from the two service water heaters, each of these being 2 in. in size and arranged so that the hot water

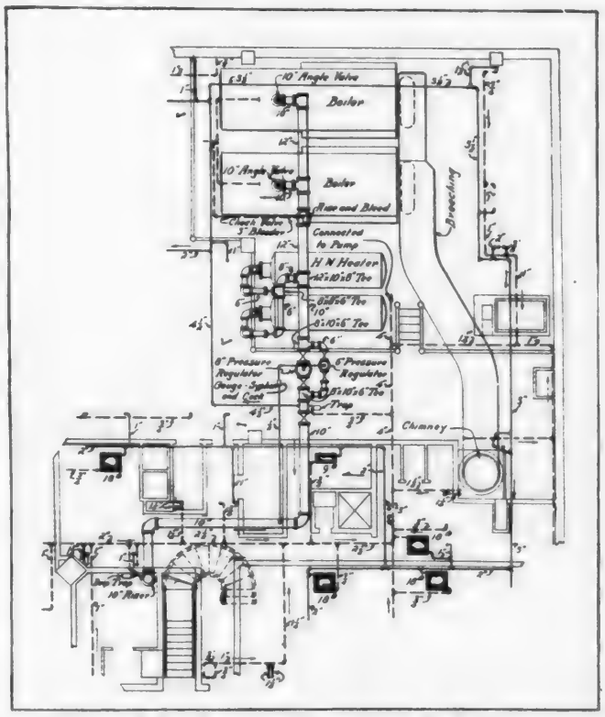


Fig. 1. Boiler Room and Main Pipe Shaft Showing Steam and Return Piping

returns may be taken care of by either receiver.

From each accumulator a 3-in. connection leads to its respective vacuum pump which discharges through 3½-in. discharge pipes, with checks and gates, into the 4-in. boiler-feed header going to the boilers. There it splits into two 6-in. valved branches, one leading into the return tapping of each boiler. It also will be noted that the suction line for each pump is cross connected to that of the other pump between the pump and the accumulator.

VENTILATION

Ventilation in this hotel also received careful attention and is provided for by two supply systems and three exhaust systems. Ducts are run vertically up through the building with outlets at each floor level. Registers have locking louvre dampers and plaster grilles, supplied by the plaster contractor, or grilles of metal mesh. Duct work is of galvanized sheet metal throughout.

In the attic space all exhaust ducts are collected into two main risers running to the exhaust fans, as shown in Fig. 3. In this plan also is given the quantity of air and the size of each riser, as well as the main horizontal trunk lines into which the risers are connected.

Numerous dampers are installed to control the air, and operating louvres and quadrants are provided with locking devices to hold the dampers in position.

FANS

Five Duplex Conoidal fans are installed, with 230-volt, direct-current motors as follows:

Capacity C.F.M.	Speed R.P.M.	Motor H.P.
4,670	650	2
17,730	321	5
1,310	477	½
1,570	512	½
11,200	192	2

Fan-motor units are set on hardwood frames which, in turn, rest on 1¼-in. pads of Korfund.

The architects for the St. Clair Hotel are Oman and Lilienthal, Chicago; the general contractor is Paschen Brothers, of Chicago, and the heating contractor is E. J. Claffey and Company, of Chicago.

Fig. 2. Detail of Arrangement of Returns and Vacuum Pumps in Basement

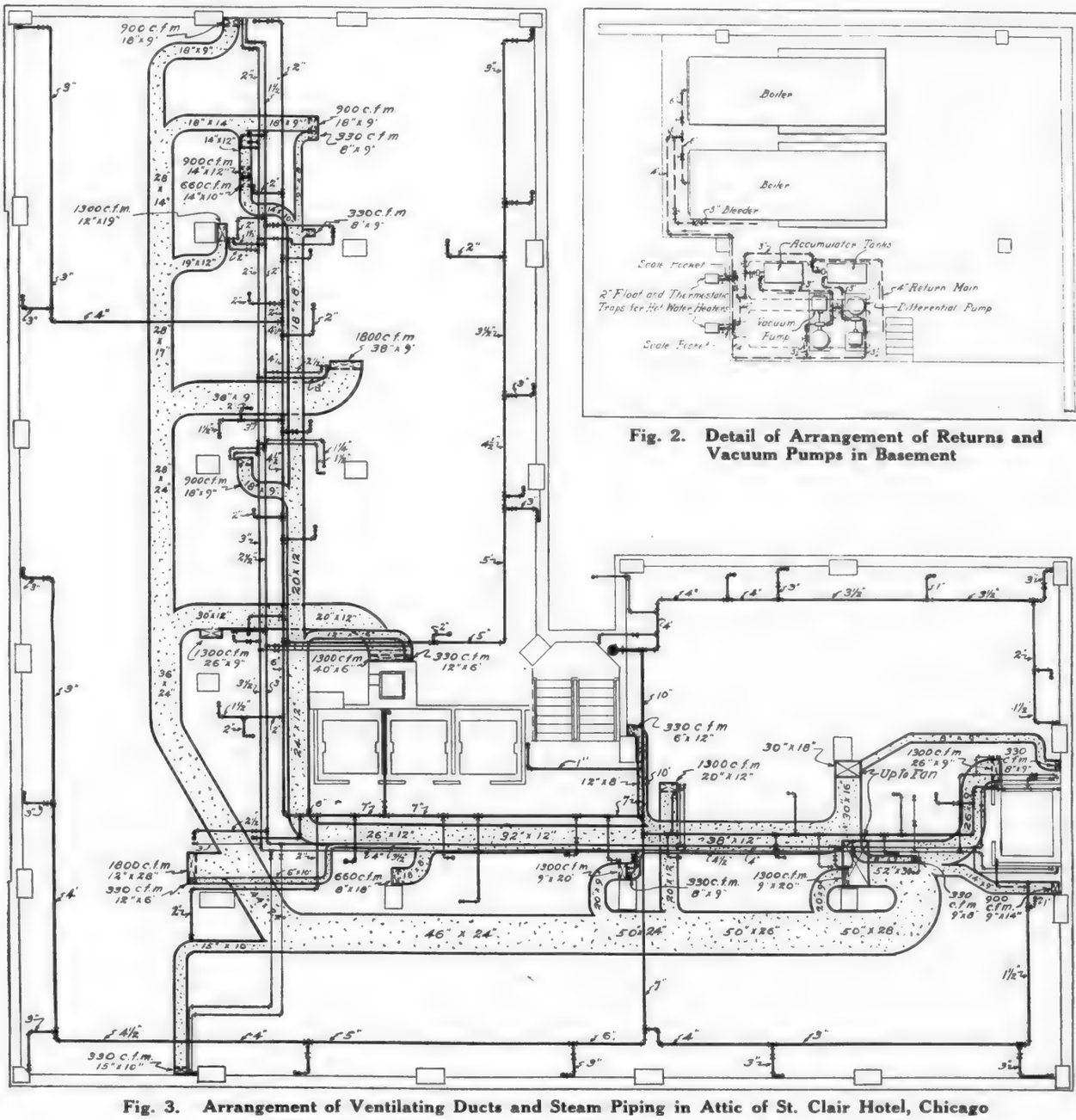


Fig. 3. Arrangement of Ventilating Ducts and Steam Piping in Attic of St. Clair Hotel, Chicago

Chicago Master Steam Fitters' Survey on Rehabilitation Work

A COMMITTEE of the Chicago Master Steam Fitters' Association, having spent considerable time in a survey of the possibilities of developing business in old building rehabilitation, reports that "this is a matter of prime importance to the interests of every master steam-fitter, warranting his immediate and energetic co-operation." In its report, the committee calls attention to the hazard in any business dependent on a single source, and points out that the average heating contractor depends almost entirely on new work for his livelihood.

The committee feels that, with proper and well-directed efforts, any heating contractor can increase the volume of his old-building work to equal or exceed his new-building work. After reciting the natural prejudices of heating contractors toward rehabilitation work, the committee reports:

"Statistics claim that considerably more than one-half the now existing buildings in our territory are without any form of radiator heating. This means there are over 300,000 prospects for old-building installations in Chicago today. Averaged at less than $700 per installation, it figures over $200,000,000. Only 1% of this work during the coming year would mean 3000 old buildings heated and over $2,000,000 of business. Well-planned advertising, with follow-up campaigns easily should develop 3% to 5% annually, or, in other words, bring 10,000 installations for old buildings involving over $6,000,000 of business per year. Here is a market of size and possibilities to tempt the largest as well as the smallest steam-fitting contractor."

METHODS OF SECURING PROSPECTS

In outlining the various means that could be employed to secure prospects, the committee recommends the employment of solicitors for a house-to-house canvass and suggests the employment of women or high-school boys for this purpose. Suggesting co-operation between the heating contractor and the plumber, the committee recommends:

"The cost of this survey could be cut in half by inducing a good live plumber to share the expense by having solicitors report whether building has running hot-water, laundry trays or built-in bath tubs, for the purpose of circularizing with printed matter furnished him by plumbing manufacturers and jobbers. To the plumber we might point out that almost every heating job secured will require plumbing work for furnishing or changing hot-water supply service, and we could agree to give him a chance to figure on each of these jobs for us in return for his co-operation in the campaign."

Cards should be furnished to be filled in by these solicitors, for each building. They should show street address and type of building, name and address of owner of building and kind of heating now in use. In addition the cards should allow space for remarks and have a series of numbered squares for convenience in checking off the follow-ups made from time to time. Solicitors could be furnished with circulars to leave with the owners, descriptive of the advantages of radiator heating and explaining certified heating. Solicitors should be instructed to turn in cards daily, and such as indicated under remarks "information wanted" or "estimates wanted" should receive immediate personal attention by promptly telephoning for appointment to measure building for estimate. When the district has been covered, the cards would constitute a complete and up-to-date heating survey.

HOW THE SURVEY SHOULD BE FOLLOWED UP

In regard to following up the survey the committee suggests:

"When the follow-up succeeds in getting a response, it is evident that he is interested and should receive personal attention, or an estimator with sales ability should make personal contact.

"When estimating, learn whether cash or time payments are involved, also if piping will be exposed or concealed. In measuring the premises it is well to make a rough sketch, not only to better visualize the whole installation and to suggest location of radiators to avoid excessive labor, and help prevent overlooking any extra costs involved in figuring, but it also will serve to impress the prospect that it requires considerable work and time to furnish estimate, and this frequently causes a sense of obligation which prevents asking additional figures from other contractors, or where others are in, the added time and care taken invariably causes a better impression and more confidence."

FINANCING TIME PAYMENTS

With reference to financing time payments, the committee advises:

"Time payments are becoming more and more popular in most all kinds of business transactions with the consumer. The prejudice of many of our members against it is unwarranted, as they can place their business through a finance company without recourse, and get immediate full payment without chance of loss."

The committee includes many valuable suggestions in connection with installation, from which the following quotations are made:

INSTALLATION WORK IN EXISTING BUILDINGS

"Installations in old buildings are made with exposed piping, concealed risers, concealed risers and arms or a combination of these. Some of our members do not hesitate to conceal piping in old buildings and have done so in numerous residences, 2, 3, 4, 6-apartment and larger buildings.

"We will attempt to point out how some of the wrinkles are solved, but for the benefit of the many who fear the consequences of possible damage due to concealing piping, we will say that owners who ask for concealed piping frequently will not object to exposed pipe in kitchens, bath rooms, clothes closets, vestibules, stair halls and behind doors or in a corner of bed rooms when location is properly pointed out. This may mean none, or at best one or two concealed pipes. By concealed piping, owners mostly refer to risers only. If told that arms will be run neatly along baseboard for a short stretch it usually proves acceptable and avoids taking up floors.

"In old buildings exposed piping should always be run with the utmost consideration for neatness and run inconspicuously as the necessary piping and circumstances will permit. Much of the demand for concealed piping was occasioned by some of the horrible examples of exposed piping frequently seen. It is quite common to see a riser standing out from the wall or corner, or a short arm or offset on the ceiling merely to avoid the need of corner or straightaway radiator valve with offset on floor above, in place of the regular angle radiator-valve.

"The common objection to exposed pipe is the extent to which it may mar the appearance of a room. Eliminate any objectionable pipe and fittings so far as possible. Take advantage of a conveniently located corner or furnace duct, clothes closet, space behind door, or drape, or a less prominent adjoining room, and undesirable showing of a riser may be avoided. When the standard radiator is a misfit, remembering the curved-corner, angle, high or low radiator, the heat cabinet or invisible radiator may be the solution.

"Where the standard radiator connections involve awkward and unsightly piping or fittings, the use of high legs or pedestals with radiator valve and ell turned at other than 90° angle; the corner and straightaway radiator valve, or the top and bottom same-end connection, with valve at return, may be the remedy.

"In making top connections, using one instead of two 45° ells by keeping close

to wall until within a few inches of radiator, tapping may improve appearance and on overhead system use of 90° instead of 45° ell to top of radiator tapping will help.

"These are all small items, but forgetting or failing to use them may mean the difference between a nice, neat installation, and one that mars the appearance of a home.

CONCEALING RISERS

"The concealed riser merely presents the problem of bringing riser up in partitions, while the complete concealed piping installation adds the problem of running arms under floors.

"Frequently the only obstruction in partitions is the 2 in. x 4 in. plate at the first story floor and ceiling level and the ceiling level of the other stories. Some also have a piece of 2 x 4 as a fire stop between the studs at a level of 4 to 6 ft. over the floor; others have cross-piece nearer ceiling while some may have both.

"Different fitters use different methods for clearing partitions for piping. We cite here three brought to our attention:

"First—remove the plaster between the two studs on one side of partition and easily remove obstructions and install piping. This is advisable for building being thoroughly remodeled.

"Second method—remove baseboards from portions of partitions where piping is to be run. This will easily permit of cutting and removing first story floor plate and rough floor beneath. Push a piece of pipe into partition from basement to reach first cross piece and remove it by hammering pipe. Done with ordinary care we are informed there is practically no danger of damaging plaster. The plate at ceiling level is cut through the baseboard opening on floor above. With a long bit a hole is bored to permit of using compass saw. Some prefer removing ceiling plate from below by cutting a hole in plaster about 6 x 10 in. in size—later patching with plaster of paris. This same idea is used for removing fire stops or cross pieces on upper floors.

"Third method—a piece of ½-in. pipe with coupling is welded on to an auger bit and starting from the roof, or attic, a hole is bored through the obstructions in partition for piping by gradually adding pieces of ½-in. pipe to extend bit. Where holes are made in roof, patching is easily done with tar paper and roofer's cement. When necessary to match an old baseboard it may be taken from a clothes closet.

"When it is necessary to put arms under floors a special saw, having a concave blade to enable sawing along the grooves of floor, is convenient. These saws are provided with a small hack-saw tip to cut through any nails reached in sawing along grooves. This prevents need for damaging any of the boards when taking up a floor. Most fitters find it advisable to provide for the assistance of a carpenter to prepare for roughing and for finishing concealed installations."

Oil-Burner Dealers in Convention Approve of Deferred-Payment Plan

AN unusual spectacle was witnessed early in May, when an oil-burner manufacturer acted as host to a gathering of more than 300 oil-burner dealers, the greater number of them interested in merchandising competing burners. The May Oil Burner Corporation, through its president, E. M. Fleischmann, had let it be known, at the recent convention of the American Oil Burner Association, that a general invitation was extended to all interested in the merchandising of oil burners, to meet in Baltimore on May 7-8, and thoughtfully discuss the many phases of this problem.

After a brief welcome, Mr. Fleischmann introduced H. E. Longley, past president of the Plumbing and Heating Industries Bureau, who acted as chair man during the convention. Leod D. Becker, managing director of the American Oil Burner Association, describing the revolution of fuels, declared that there is a definite and unalterable trend toward the use of automatically fired heating devices. He said the ultimate market in the United States has approximately 12,000,000 home-owners who are now ready to buy.

Marquis Regan, president, Marquis Regan, Inc., presented an analysis of a large number of sales, showing that while 23% of sales were made by personal solicitation, and 27% through advertising, 50% were effected through friends of users who advocated the use of oil burners to their friends. He compared progress made in the development of other industries as indicative of the volume of immediate sales that could be aggregated by the use of the deferred payment plan.

H. D. Lewis, vice-president of the Commercial Credit Company, discussed the possibilities and limitations of the deferred payment plan and assured the members of the safety of this scheme, urging their conscientious consideration.

Edwin S. Jeffries, assistant to President Fleischmann of the May Oil Burner Corporation, discussed advertising, and, using large posters to illustrate his remarks, pointed out the benefit of supplementing all personal sales efforts with intensified advertising.

An interesting dialogue was "pulled of" by Professors Borden and Busse of New York University, showing the method of successfully concluding a sales argument. The scheme of attack was based on observations made on more than 15,000 interviews.

The cost of inspection and service was brought out in a talk by L. L. Halle, manager, May Westchester Oil Burner Corporation.

Prof. Collins P. Bliss, director of the Popular Science Institute of Standards, and assistant dean of the College of Engineering, New York University, spoke of a nation-wide oil-burner survey during which the bureau made 1586 personal calls in various cities, and 1757 contacts by mail, taking in 232 towns in 30 different states. This survey was in the form of a questionnaire on installation satisfaction, which showed 97% approval; service satisfaction, 98% approval; calls per burner per season, figures here showed less than two calls per burner per season; noise, practically nil—8% replied that it made no difference; cost versus coal, one-third replied that oil fuel cost more than coal; two-thirds stated that oil cost less than coal, and, in most all instances, the cost did not figure so much as the convenience and value of having an oil burner. In this survey only burners approved by the Underwriters' Laboratories were included.

A. C. Mayer, manager, refrigeration merchandise department of the General Electric Company, spoke on "Applying Merchandising to the Oil-Burner Industry," with the following three principles to be followed: First, to be sold on the burner yourself; second, create confidence in the mind of the prospect; third, show the need for your particular product. Following Mr. Mayer's address the meeting was thrown into an open forum on the sales phase of the oil-burner business.

C. B. Sweatt, vice-president of the Minneapolis-Honeywell Company, made a few brief remarks on sales resistance.

The final speaker on the program was A. J. Fleischmann, treasurer of the May Oil Burner Corporation, who advocated the use of the deferred payment plan, pointing out that America, being a nation of spenders, should be asked to buy out of income rather than principal. "The American buying public to-day," said Mr. Fleischmann, "knows little of oil burners, and must be educated to their use."

Luncheon was served in the convention hall, which kept the dealers together and each session was carried on without delay.

On Monday evening an informal beefsteak dinner was given the dealers on the roof of the Southern Hotel; on Tuesday evening, a banquet and dance was held in the grand ballroom of the Alcazar.

During the business sessions of the convention, the ladies were entertained on a sightseeing tour of Baltimore with luncheon at the Country Club and an afternoon at the races at Pimlico.

W. J. Harter, Buffalo Automatic Heating Corporation, and president of the Niagara Frontier Oil Heating Association, has been appointed manager of the Dealer Division, American Oil Burner Association. This new appointment was voted upon at the annual meeting of the association in Chicago, April 3-5, 1928, when it was decided to engage a full-time manager of this division.

Radiators Cast Continuously

By J. B. Nealey
American Gas Association

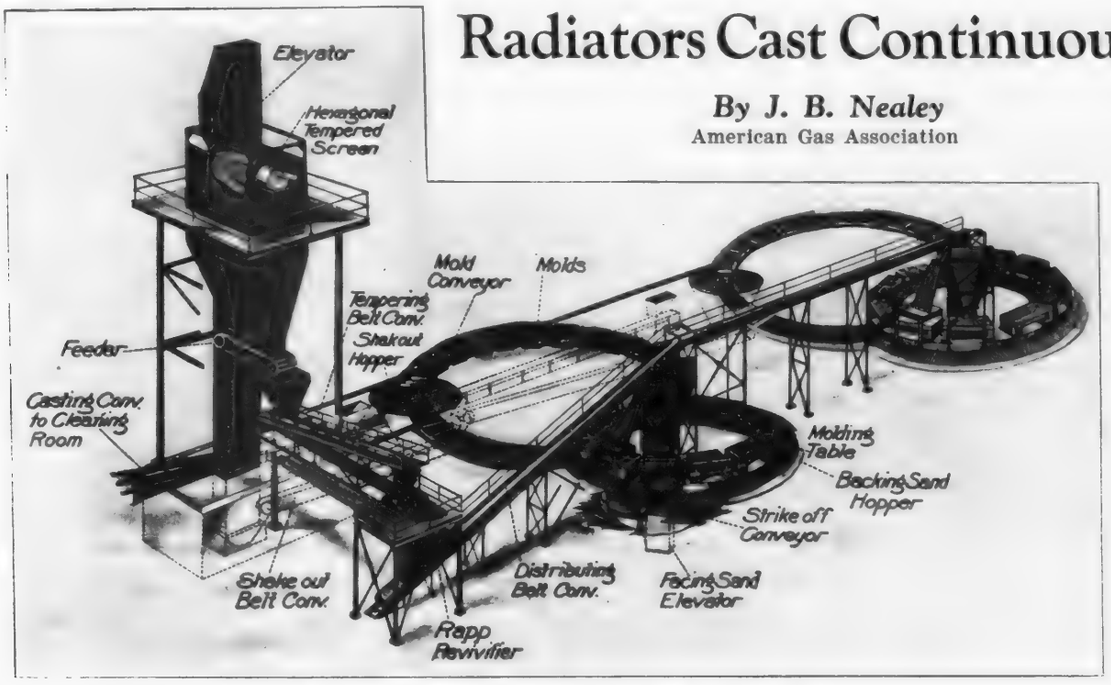


Diagram of a Continuous Radiator Molding Plant

A REFINEMENT in foundry practice is found in the plant of the Richmond Radiator Company, at Uniontown, Pa., where tubular radiators, instead of being produced intermittently, are cast in a continuous operation, greatly increasing the output of the foundry.

Until recently it was thought that two types of radiators were necessary, one for hot water and the other for steam, or vapor. Comparatively recent investigations have demonstrated that the water type can be used for all purposes, obviating the necessity for the manufacture of two different types and for carrying them in warehouse stock. This simplification has made possible the production of a single line of radiators with a minimum number of patterns and has done much to decrease production cost per unit.

The foundry of the Richmond Radiator Company is one of the most modern and up-to-date in the country and occupies a space of nearly an acre. The introduction of the new equipment has resulted in a large volume of output in proportion to the space utilized and the manual labor involved. This is brought about by the use of a continuous molding machine, eliminating unnecessary handling, reducing the number of workmen to a minimum and making it possible for the men to work continuously at an unusually high rate of speed.

The machine consists of two large annular rings, set close together, one for molding and the other for pouring. The first is made up of two large cast-iron rings, joined together to form a circular frame which is about 15 ft. in diameter. This frame sets on rollers and is rotated by a motor. Molding machines are mounted on this frame at intervals and when rotated each molding machine passes successive workmen, each performing some operation until the flask is made up. The flask is then transferred to the pouring ring where the pouring and shakeout take place.

Each workman occupies a station around the ring and the operations, in sequence, are as follows:

1. Pattern is mounted on molding machine.
2. Pattern cleaned by brush and compressed air.
3. Chaplets set in to hold core.
4. Flask set on molding machine.
5. Flask filled with sand from overhead conveyor.
6. Sand rammed with automatic rammer.
7. Excess sand cleaned off.

The flask is then made up and ready for pouring and at the last station is lifted by air hoist and transferred to the pouring circle.

Of similar construction is the pouring circle except that it is flat to receive the flasks and is 25 ft. in diameter. The increased size is to give a sufficient cooling period between the pouring and shakeout. Stations and operations, as here performed, follow:

1. Cores set in mold.
2. Flasks stacked three high.
3. Metal poured.
4. Castings shaken out.

Castings are shaken out over a grid and the sand drops through onto a belt conveyor which removes it to a bucket elevator. After being elevated to overhead storage bins the sand is dumped, passing through revivifiers as it does so. The castings are hooked onto another belt conveyor and taken to the cleaning room, while the flasks are returned to the molding crew.

Mold Conveyor 30 Ft. in Diameter, with Sand Preparing Unit in Background

Assembling Radiators on a Four-Station Machine

MAKING THE CORES

Core making, baking and handling are also arranged to give the greatest production with a minimum of time and labor. There are core ovens arranged in a single row and the core-making department parallels this on one side, in a space 50 by 100 ft., while the core storage occupies a similar position on the other side with a space 50 by 186 ft. The cores are made and run into the oven from one side and when baked are run out the other side into the storage room, where there is space for 2,000,000 sq. ft. of radiation.

The cores are stacked on racks as made up and the racks placed on cars which are run into the ovens. A system of tracks is laid out for the cars to run on. Four sets of tracks run into the core-making room and between these are the core-makers' benches. As fast as the racks are filled up they are lifted onto the cars by means of hoists on overhead monorail tracks. This monorail system also serves to bring in sand from another building.

There is a track paralleling the ovens on the front and another in the rear, both running the entire length of the line. The loaded cars can be run onto the first line from the core-making rooms and charged therefrom into any oven. When discharged onto the other side they can be run up and down the track to any one of eight cross tracks which run out into the cooling and storage rooms.

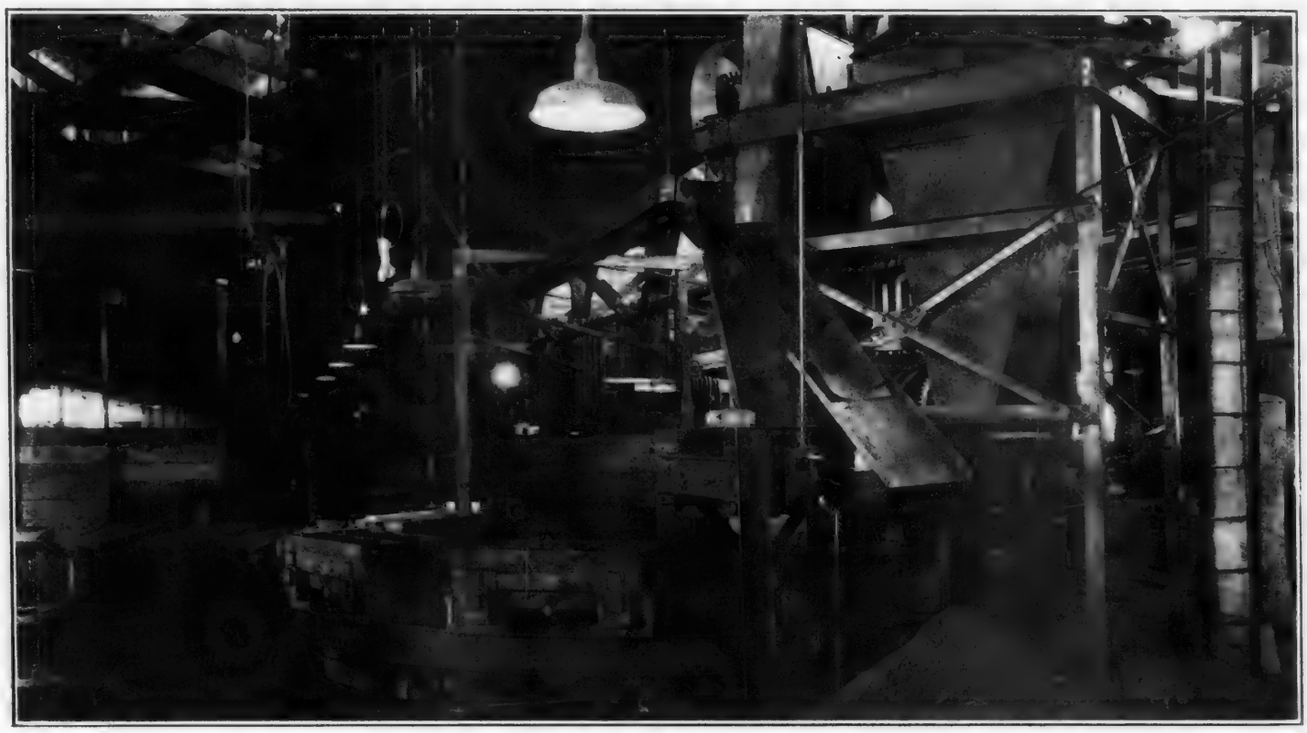
This department and the foundry are served with connecting monorail systems and the cores after being unloaded and stacked, are placed in baskets suspended from the monorail and delivered to the molders.

The core ovens are each 10 ft. wide, 8 ft. high and 14 ft. deep from entrance to rear. They are heated with gas burned in two or three long pipe burners, running from front to back and located close to the bottom. Each oven holds a single rack which contains from 150 to 450 cores, according to size. A temperature of 400° F. is maintained and the baking periods range from two to three hours, according to core mixture, size, etc. A recording pyrometer for temperature control is a part of the equipment of each oven. Gas has been found to be the most efficient, the easiest controlled and the cheapest fuel in this plant.

Cores are made of sand, water and oil. The water is evaporated when baked in the oven and the oil is driven out by the heat produced when the molten metal is poured into the mold. Thus the core holds together just long enough to pour the casting, after which it disintegrates and the sand is poured out of one of the small openings in the end of the cast section.

MACHINE-CLEANING THE CASTINGS

The cleaning room is 50 by 100 ft. and is equipped with brushing machines for cleaning the castings. These machines consist of two sets of revolving wire brushes with a traveling conveyor just



Molding Radiators Continuously on Revolving Table 15 Ft. in Diameter in Plant of the Richmond Radiator Company, Uniontown, Pa.

below. Radiator sections are placed on the conveyor and are taken automatically under and in contact with the brushes when they are turned over and passed through a second time.

In the machine, test and assembly building, which is 100 by 205 ft., the sections are stacked on skids and handled from one operation to another with high lift trucks. They are first set between two clamps with water hose and filled with water, when a pressure of 120 lbs. is put on in order to detect any leaks.

A battery of 12 reaming machines next receives the sections and the port holes are reamed out. The port in one side of the leg section is then threaded. They are then ready for the assembly.

THE ASSEMBLY DEPARTMENT

Completed radiators are made up of a number of sections ranging from 2 to 60, the latter being for long halls in public buildings. They are put together in an hydraulic assembly machine consisting of four tables in the form of a cross. Enough sections for a unit are put onto the first table with a leg section at either end. Malleable-iron push nipples are placed between each section in the ports.

The table is then revolved to the next station and then to the third station where the unit is elevated about 2 ft. and forced together in a horizontal press. This makes the joints water tight and as strong as the casting itself. Revolved to the last station long bolts are put in and the nuts tightened, which completes the assembly.

The radiators are then set up on the testing floor, filled with water and tested for leaks at 100 lbs. pressure.

There is a modern pattern shop equipped with wood and metal-working machinery for the making of both wood and metal patterns. There is also a completely-equipped machine shop for the necessary machine work in the plant.

American and Belgian Win $15,000 in Prizes

James W. Owens, director of welding for the Newport News Shipbuilding & Drydock Co., at Newport News, Va., won the first prize of $10,000 offered by The Lincoln Electric Co., Cleveland, in its arc-welding contest. The prizes were announced and distributed at the spring meeting of the American Society of Mechanical Engineers, held in Pittsburgh, May 14. The second prize of $5,000 was awarded to Henri Dustin, professor in the engineering school of the University of Brussels, Belgium, and director of the laboratory for material testing. The third prize of $2,500 went to Commander H. E. Russell, Construction Corps, United States Navy, instructor in mathematics at the U. S. Naval Academy, Annapolis.

Among the 77 papers submitted, 13 were entered by residents of foreign countries.

Having rejected 66 papers after the first reading, the final selection was by letter ballot, the paper by Mr. Owens receiving a unanimous vote for first prize.

The winning paper is described by the author as "a treatise on the fundamentals of arc welded design and shop practice, and an analysis of its industrial application and world-wide possibilities." Over 100 photographs, charts, tables and drawings illustrated the text matter.

Summer Welding School at Purdue University

For the benefit of those wishing to receive expert training in the art of welding, a nine weeks' course is scheduled at Purdue University, Lafayette, Ind., beginning June 14. This is but one of a series of special courses in intensive shop practice, administered under the direction of the department of practical mechanics of the schools of engineering; other courses being in drafting, job-shop methods, pattern making, forging and heat treating and tool making. The enrollment fee for the welding course, including laboratory fee and supplies is $37. Correspondence regarding these courses should be addressed to the Department of Practical Mechanics, Purdue University, Lafayette, Ind.

Forty-Five Mile Gas Pipe-Line Electrically Welded

What is said to be the longest length of electric-arc-welded pipe line in the world, extending from Lamkin to Hodge, La., has recently been completed. It is 7-in. in diameter and carries from 600 to 1000 lbs. pressure. It is stated that this line was welded at a cost of $1.25 per joint. The country over which the line ran was very rugged and broken with hills, deep ravines, woodlands, swamps and there was a large river to cross. Five gas-engine-driven "Stable-Arc" Lincoln welders were used, each being mounted in a wagon drawn by "two mule-power" teams, each welder supplying current for four men simultaneously welding as many consecutive joints. The line was built in five-mile stages, each stage being finished and tested under hydrostatic or gas pressure before being joined to the next stage. Joints all were made in two layers and it is said that only 14 pin holes occurred in 11,000 joints.

Shortly after completion, and before the line had been entirely covered, there occurred a sharp cold spell when the temperature dropped to six above zero. Despite the contraction produced by this low temperature, there was no sign of rupture in the entire line.

PRACTICAL SHEET-METAL DUCT CONSTRUCTION, by William Neubecker, has appeared in the fourth edition, greatly enlarged and revised. In addition to its usefulness to the sheet-metal contractor, the volume goes at length into the more elaborate duct construction used in heating and ventilating systems. An entire chapter, for instance, is devoted to the construction of various slip joints. Another chapter is devoted to ceiling ducts of the rectangular type, showing not only their design but commonly-used methods for hanging and supporting them. Other chapters cover elbows, register boxes, registers, ducts and casings for indirect heating, and dampers for large ducts. Under the heading of "Taking Off Quantities of Material in Duct Work," the author gives a detailed explanation prepared by J. Kojan of the F. C. Thornton Company. An index makes it easy to refer to any given subject. Size 5½ in. x 8 in. Pp. 225, with 237 illustrations. Cloth $3. Published by the Sheet Metal Publication Co., 150 Nassau St., New York, or may be had through the Book Department of THE HEATING AND VENTILATING MAGAZINE.

Electric Welding a 7-In. Gas Pipe-Line in Louisiana

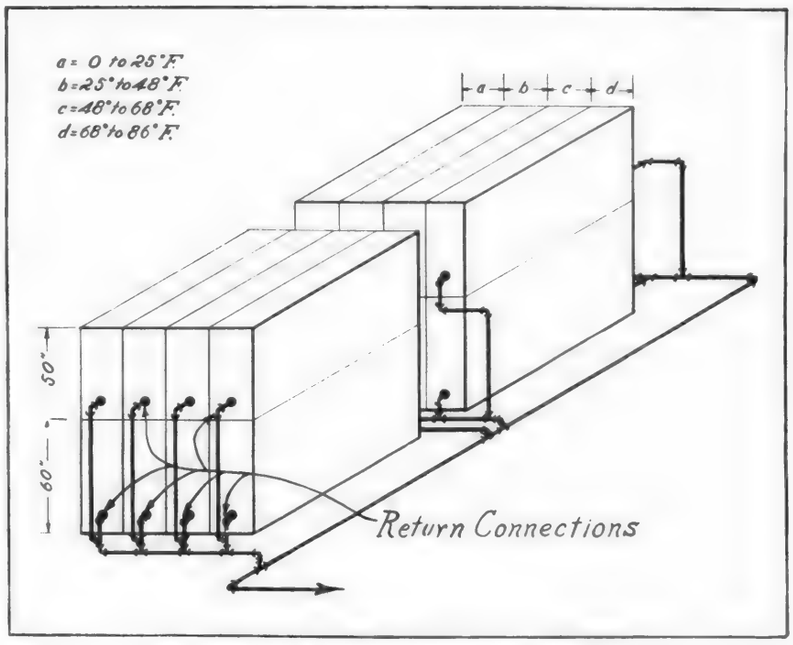
How Would You Do It?

Question No. 10

A Vento heater is arranged four rows deep, two stacks wide and two stacks high, with return connections on both ends of each stack. The bottom stacks are 60-in. high and the top stacks 50-in. high. The heater handles 100,000 cu. ft. of air per min. The temperature rise of the air through the four rows is as follows:

First Row..... 0° F.—25° F.
Second row .....25° F.—48° F.
Third row .....48° F.—68° F.
Fourth row .....68° F.—86° F.

What will be the equivalent direct radiation load represented by the condensate coming from each return connection?



Problem Presented in Question 10

IN this problem it is desired to know the load on each return connection from each stack of Vento heater, although any other type of heater can be calculated by the same method.

For purposes of calculating the heating effect occurring in each stack it first is necessary to know how much heat is imparted by the stack to the air passing over the stack—in other words the temperature rise of the air passing over each stack. To avoid complication this temperature rise was assumed and stated in the question.

Consequently the first row of the heater raises 100,000 cu. ft. of air per minute from 0° to 25°, or 25° F. temperature rise. Now it is well known that at these temperatures 1 B.T.U. will raise approximately 50 cu. ft. of air 1° F. and, at 70° F., 1 B.T.U. will raise approximately 55 cu. ft. of air 1° F., the difference being due to the expanded condition of the air at higher temperatures. It therefore will be wise to assume 50 cu. ft. to 1 B.T.U. for the first two rows of heater and 55 cu. ft. to 1 B.T.U. for the last two rows of heater.

With 100,000 cu. ft. of air per minute being handled by the heater, the work done in the whole first row—right across the face of the entire heater—first will be considered.

$100{,}000 \text{ c.f.m.} \times 60 = 6{,}000{,}000 \text{ c.f.h.}$

$$\frac{6{,}000{,}000 \text{ c.f.h.}}{50} = 120{,}000 \text{ B.T.U.}$$

(for 1° rise).

$120{,}000 \times 25$ (desired rise) $= 3{,}000{,}000$ B.T.U.

$$\frac{3{,}000{,}000}{240} = 12{,}500 \text{ sq. ft. E.D.R.}$$

This may be condensed into one operation according to the following formula:

$$\frac{60\ TQ}{240\ C} = \text{E.D.R.}$$

in which

T = temperature rise in air
Q = quantity of air in c.f.m.
C = cubic feet of air raised 1° by 1 B.T.U.
240 = radiator emission in B.T.U. per hour.
E.D.R. = equivalent direct radiation.

If this formula is used, and the proper values substituted for T, Q and C it becomes

$$\frac{60 \times 25 \times 100{,}000}{240 \times 50} = 12{,}500$$

From this it will be seen that the first row of the heater is doing heating work equivalent to 12,500 sq. ft. of direct radiation.

The next thing to be considered is how much of the condensate of this heating load is carried by each return connection, and for this purpose it is necessary to divide the load up among the four stacks of heater, which stacks are two wide and two high, and have the lower tier made up of 60-in. sections while the upper tier consists of 50-in. sections.

With this arrangement of heater surface the two stacks in the bottom tier will occupy 60 in. out of the total height of the heater while the two upper stacks will occupy 50 in. of the total heater height. The total heater height, as far as effective surface is concerned, will be 110 in., and the proportion of work done in each tier will be in proportion to the ratio that the height of that tier bears to the total height.

In the case of the lower tier this is

$$\frac{60}{110} \text{ or } \frac{6}{11} \text{ of the total,}$$

and in the case of the upper tier it is

$$\frac{50}{110} \text{ or } \frac{5}{11} \text{ of the total.}$$

As the entire E.D.R. already has been found to be 12,500 sq. ft., that for the bottom tier will be

$$125{,}000 \times \frac{6}{11} = 6818 \text{ sq. ft.}$$

and that for the upper tier will be

$$125{,}000 \times \frac{5}{11} = 5682 \text{ sq. ft.}$$

But both upper and lower tiers are divided into two stacks each, so that each stack (provided that the stacks are of equal size and area) would carry half of the *tier* load which for the upper tier would be

$$\frac{5682}{2} = 2841 \text{ sq. ft. per stack,}$$

and for the lower tier

$$\frac{6818}{2} = 3409 \text{ sq. ft. per stack.}$$

With returns on each end of each stack, each return would carry one-half of the stack load. In the case of the upper tier stacks, each return connection would carry

$$\frac{2841}{2} = 1420.5 \text{ sq. ft. per return conn.}$$

and in the case of the lower tier stack each return would carry

$$\frac{3409}{2} = 1704.5 \text{ sq. ft. per return conn.}$$

But this applies to the first *row* only, as the work done in successive rows be-

comes less and less, as the air temperature approaches the steam temperature.

Thus, using the formula previously given, and substituting the proper values for the second row, the E.D.R. will be

$$\frac{60 \times 100{,}000 \times 23}{240 \times 50} = 11{,}500 \text{ sq. ft. E.D.R.}$$

of which the E.D.R. for the top tier will constitute $\frac{5}{11}$ and the E.D.R. for the bottom tier will form $\frac{6}{11}$ making

$\frac{5}{11} \times 11{,}500 = 5227$ E.D.R. top tier, and

$\frac{6}{11} \times 11{,}500 = 6273$ E.D.R. bottom tier

or 11,500 E.D.R. total

and dividing this between two stacks and two return connections in each stack will make a quarter of the load come on each return connection or

$\frac{5227}{4} = 1307$ sq. ft. for each return connection on top tier

$\frac{6273}{4} = 1568$ sq. ft. for each return connection on bottom tier.

When calculating the third and fourth rows the same formula may be used except that the 50 cu. ft. of air raised 1° for each B.T.U. is changed to 55 cu. ft., as previously explained.

Then, for the third row, the formula becomes

$$\frac{60 \times 100{,}000 \times 20}{55 \times 240} = 9091 \text{ sq. ft. E.D.R. per row}$$

$\frac{6}{11} \times 9091 = 4959$ sq. ft. for lower tier,

and

$\frac{5}{11} \times 9091 = 4132$ sq. ft. for upper tier

or 9091 sq. ft. total

$\frac{4959}{4} = 1240$ sq. ft. for each return connection, and

$\frac{4132}{4} = 1033$ sq. ft. for each return connection.

For the last row the calculation is:

$$\frac{60 \times 100{,}000 \times 18}{55 \times 240} = 8173 \text{ sq. ft. E.D.R.}$$

for last row, with

$\frac{6}{11} \times 8173 = 4458$ sq. ft. for bottom tier

$\frac{5}{11} \times 8173 = 3715$ sq. ft. for top tier

or 8173 sq. ft. total

$\frac{4458}{4} = 1115$ sq. ft. for each return conn.

and

$\frac{3715}{4} = 929$ sq. ft. for each return conn.

A summary of the above calculations then shows that the load on each return connection from each stack is as follows:

	Upper Stack E.D.R.	Lower Stack E.D.R.
1st Row	1420	1704
2nd Row	1307	1568
3rd Row	1033	1240
4th Row	929	1115

And with these amounts the returns can be connected up in any manner desired and the pipe size determined from the combined E.D.R. carried by each portion of the return.

PROBLEM FOR NEXT MONTH

Question No. 11

What size closed expansion-tank would be required on a forced circulation hot-water system in which the total pumping head is 40 ft., the gravity head 10 ft., and the allowable difference in pressure in the closed tank 5 lbs.? Assume that the system contains 5500 gal. of water, and, when filled up cold, the water is at 40° F.; that the highest temperature of the water is 212° F.; also that the expansion tank is connected to the discharge side of pump. If compressed air is available, how much could the tank capacity be reduced, and what would be the initial air pressure used?

Unit Heaters in a Power House

In order to secure proper heat distribution in a power plant in a mid-western city, three Hi-Jet unit heaters, manufactured by the Herman Nelson Co., Moline, Ill., were installed. The problem required the source of heat to be under a deck supporting turbo-generators, causing heat diffusion throughout the room, which has a ceiling 70 ft. high.

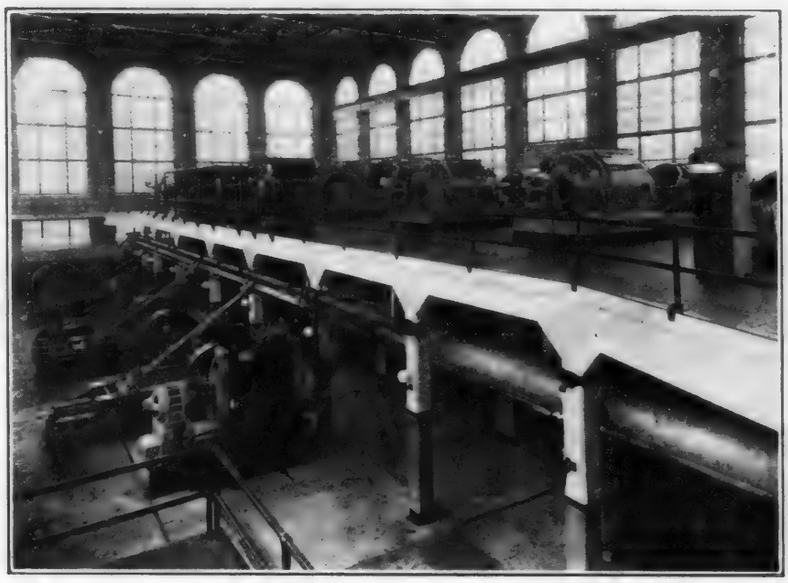
Ceiling Type Unit Heater in Electric Power Plant

A solution was secured by hanging these unit heaters directly on the steam piping where they operate with a steam pressure of 150 lbs.

Editor Appointed Professor at Harvard

C. Harold Berry, for three years associate editor of *Power*, has been appointed to succeed Dr. Harvey N. Davis as professor of mechanical engineering in the Engineering School, Harvard University. Dr. Davis recently was elected president of Stevens Institute of Technology, Hoboken, N. J.

Previous to his editorial position, Professor Berry was technical engineer of power plants of the Detroit Edison Company, and prior to that he was assistant professor of heat power engineering at Sibley College, Cornell University.



This Power Plant Is Heated from Units Suspended Under Deck

American Radiator Company Inaugurates Million-Dollar Replacement Campaign

THE long-awaited movement on the part of the heating industry to secure its share of the public's buying dollars, in competition with the automobile, radio, washing machine, vacuum cleaner and refrigerator industries, has been inaugurated on a national scale by the American Radiator Company. The campaign is being conducted through the company's Vecto stores, which have been established in great numbers over all the country.

Each store is in charge of a trained salesman. He makes no attempt to call on new home-owners or building contractors, but confines his efforts to the canvassing of old homes. His store represents a sub-showroom for the display of all the products of the company. He operates by making a house-to-house canvass each day, taking a census of the heating equipment of each home and shop in the territory. He records the type of heating plants installed in each home, whether it be a stove, warm-air furnace, or a radiator plant, and he finds out when it was installed. He secures the same kind of information on hot water supply equipment.

INSTALLATION OF PLANTS TURNED OVER TO LOCAL HEATING CONTRACTORS

Emphasis is directed by the company to the fact that all of the radiator business developed by the company's representative is turned over to local heating contractors. In this way, it is anticipated, thousands of additional radiator heating prospects—all representing new business—will be secured through the efforts of these special salesmen. In every case the installation of the plant will go to the heating contractors cooperating with the company.

POSSIBILITIES DISCLOSED BY COMPANY'S SURVEY

In a preliminary survey, which formed the basis for the company's campaign, it was learned that there are approximately 1,000,000 homes supplied yearly with heating apparatus of one kind or another. Of these only about 300,000 are being equipped with radiator heating. The balance of 700,000 are being served with types of equipment rarely installed by heating contractors.

Here at once is unfolded a definite market for radiator heat, *more than three times larger than that which the industry is now serving!*

Yet, these 1,000,000 homes do not represent the total potential market. There now exist 17,000,000 homes in America which are unequipped with radiator heat.

LOW COST OF MODERN RADIATOR HEAT

One of the significant facts learned through the survey is that home-owners and home-buyers have the notion that radiator heat for an average six or eight-room house costs $1000 and up, instead of from $400 to $600. It also was found that it never occurs to the average home-owner that he can secure radiator heat on the easy-payment plan, nor is he aware that his local building and loan association, co-operative bank, or other financial organization, stands ready to finance radiator installations on the basis of eight years or more to pay. It is figured that 700,000 jobs are lost to the heating contracting industry each year, due to the lack of sales effort.

CAMPAIGN CONDUCTED THROUGH COMPANY'S VECTO STORES

One of the first moves made by the company in the organization of its sales campaign is the use of so-called Vecto stores through which the company's representative can operate. Another important feature of the plan is the organization by the company of the Heating and Plumbing Finance Corporation, which will finance the installation of the company's radiator heating products on time payments, with as long as three years to pay. Heating contractors using this plan receive their full cash payment immediately upon the completion of a job. The finance corporation attends to the details of collection from the owner. The whole purpose behind the organization of the Heating and Plumbing Finance Corporation is to increase sales for heating contractors and not to make profit on its financing operations.

In the house-to-house canvass, when the representative finds a warm-air furnace installed, his first duty is to try to sell radiator heat. This also applies to houses equipped with a stove. If that is out of the question, he urges the purchase of a Vecto heater, after explaining that it is not the equal of radiator heat but is the next best method of heating without the use of radiators. In homes equipped with radiator heat, but having an obsolete boiler in the cellar, he tries to sell a Red Flash boiler.

As the company points out, the important fact is that he is out ringing door bells, calling at homes already built and taking radiator heat to every home owner. By turning over all the radiator business he develops to the heating contractor, the contractor secures thousands of additional heating prospects.

SALESMEN ALSO PUSHING WATER HEATER SALES

Another important function of the company's special salesmen is to push the sale of Ideal water heaters. Here again a survey reveals that some three million water heaters are sold in this country every year. Of these only about 10% are automatic storage heaters. Yet the automatic storage heater is far more desirable from the home-owner's viewpoint and offers a considerably larger margin of profit to merchants.

One of the 275 Vecto Stores of American Radiator Company

The difficulty in the way of increased sales of automatic storage heaters is, again, lack of knowledge on the part of home-owners, both in respect to the advantages of this type of heater and its approximate price.

As in the case of radiator business, every order for water heaters obtained by the company's special salesman represents plus business because he solicits old homes only. As in the case of the house-heating plants, the installation is turned over to the heating and plumbing contractors.

THE COMPANY'S ANNOUNCEMENT

In a special announcement issued over the signature of President C. M. Woolley, the company summarizes its new selling effort in the statement that:

"We have organized a comprehensive, intensive and aggressive sales and advertising campaign to promote radiator heating consciousness in the public mind, to explain the benefits of radiator heating, to remove the obstacles that stand in the way of its universal adoption, to give home buyers and home-owners some idea of the cost of radiator heating, and tell them how easily the money can be obtained for its installation and the convenient terms of payment that may be arranged."

In visualizing the possibilities of the plan, Mr. Woolley adds that:

"The heights to which we can build are unlimited. But we must build according to a plan and with the utmost faith, confidence and co-operation on every side.

"With mutual faith and confidence on the part of every member of our profession—contractor, wholesaler, and manufacturer—each giving his enthusiastic, whole-hearted support to the same ideal and the same program of progress, our industry will advance into a new era of service and increased prosperity. But without this union of thought and action, without faith and confidence on every side, our industry will not rise to the level of its great opportunity."

STATEMENT WHICH CLEARS UP MISUNDERSTANDING OF COMPANY'S PROGRAM

Due to the fact that some misunderstanding has arisen over the company's new selling plan, leading many heating contractors to believe that an attempt is being made to deal direct with the home-owner in the sale of heating equipment, a special announcement issued by the company declares that:

"The American Radiator Company is pleased to take this opportunity to pledge itself to keep inviolate the long-established channels for the distribution and installation of our radiator heating products . . . We recognize wholesalers as the proper distributors of these products and the heating contractor as the only authentic medium through whom the public shall secure these products and the installation thereof. Our entire sales-building program is based on these principles."

Two-Year Contracts for Domestic Oil Fuel Announced by Standard Oil

ALMOST significant innovation has been announced by the Standard Oil Company of New Jersey and the Standard Oil Company of Louisiana. These two companies now are offering domestic oil-fuel on a two-year contract basis. Sales will be made at a fixed price covering the householder's requirements for the next two heating seasons, that is, until May 1, 1930. This step has been taken in furtherance of the policy which the companies adopted two years ago of encouraging the use of oil for domestic heating purposes.

From the current issue of "The Lamp," published primarily for employees and stockholders of the Standard Oil Company of New Jersey, the following comments are taken:

"During the past eight years this country has witnessed a development that bids fair to revolutionize home-heating to an extent comparable with the change brought about in transportation methods by the automobile. Since 1920 the use of distillate oils and manufactured gas for domestic heating has increased steadily until to-day there are in the United States more than 680,000 homes heated by oil and 118,000 homes heated by manufactured gas. During the past three years the growth in the use of distillate fuel oils for home-heating has been rapid, the quantity so used doubling in volume during this period.

DOMESTIC OIL FUEL MARKET IMPORTANT

"The importance of this field to the oil industry is apparent when it is realized that one domestic oil burner, on the average, uses per year four times the volume of liquid fuel consumed by one automobile. The installation of ten times the number of domestic oil burners even now in use will give a consumption of petroleum equal to that demanded by the present automobile industry.

"The pioneer domestic burners were simple in design and were not automatic in action, but the tendency during recent years has been towards automatic, electric-motored, fully-controlled burners equipped with adequate safety devices. Many makes of oil burners suitable for domestic use are on the market, and the dependability of many of them has been proved by several years of satisfactory performance. An ever-increasing number of families now are enjoying the pleasures and benefits of automatic home-heating, obtaining this result with mechanism almost free from attention, yet safe, dependable, clean, and at a cost that is reasonable, considering the service rendered.

"At its inception and during the early years of its growth the domestic oil-burner industry progressed without orientation.

"During this period the public was receptive, interested in oil heating, and actually absorbed several hundred thousand of the simpler and more primitive types of oil burners, but, on the whole, sales were confined to the householder in an exceptional position.

OIL BURNER INDUSTRY RAPIDLY BEING STABILIZED

"The oil-burner industry definitely passed out of this phase about two years ago. The fully-automatic type of oil burner, designed to burn semi-refined products, of lower cost than kerosene, delivered in bulk and in large quantities by tank-wagon, became the dominant type, and was recognized as the only type suitable for general use. Sales were not made on a basis that cost of oil heat would be less than coal, but on an entirely different basis—the basis of true economic value. In this sense, domestic oil heating is not a competitor of coal heating but of gas heating. Only by oil or by gas is it possible to obtain clean, trouble-free, automatic heating, which dispenses with all necessity for manual labor or skilled attention. The net economic worth of oil heating now is recognized as justifying a considerably higher cost per unit of heat value for oil than for coal. With this picture before it, the oil industry has had to answer only one question: Is there reasonable assurance that oil may be provided in the quantities required for the expected expansion of the domestic heating market, at a price level below its economic value for this purpose? There has been no hesitation in answering this question affirmatively.

FLUID FUELS FOR THE FUTURE

"Oil as a fuel for domestic heating under the conditions of present market-expansion, is going into a legitimate field of high utility in which its only true competitor is manufactured gas. It is difficult to assume with exactness what its price limit in this field will be, but it is clear that the limit is far above any price which this grade of product has brought even during those brief periods in the phenomenal expansion of the gasoline market when prices have been far above current levels.

"The oil production situation justifies, as does the best forecast which can be made of the future balance of production and consumption, real confidence in the relative stability of petroleum prices for the future.

"The extension of the fixed price contract term for domestic heating oil from one to two years is a step which is now possible and which the Company is glad to take in furtherance of this policy and in the expectation that it will result in a more rapid growth of what now is accepted as a great and legitimate market for semi-refined petroleum products."

Correspondence

Conducted by T. W. Reynolds

Determining Room Temperature and Proportionate Fuel Costs for Two Tenants

EDITOR HEATING AND VENTILATING MAGAZINE:

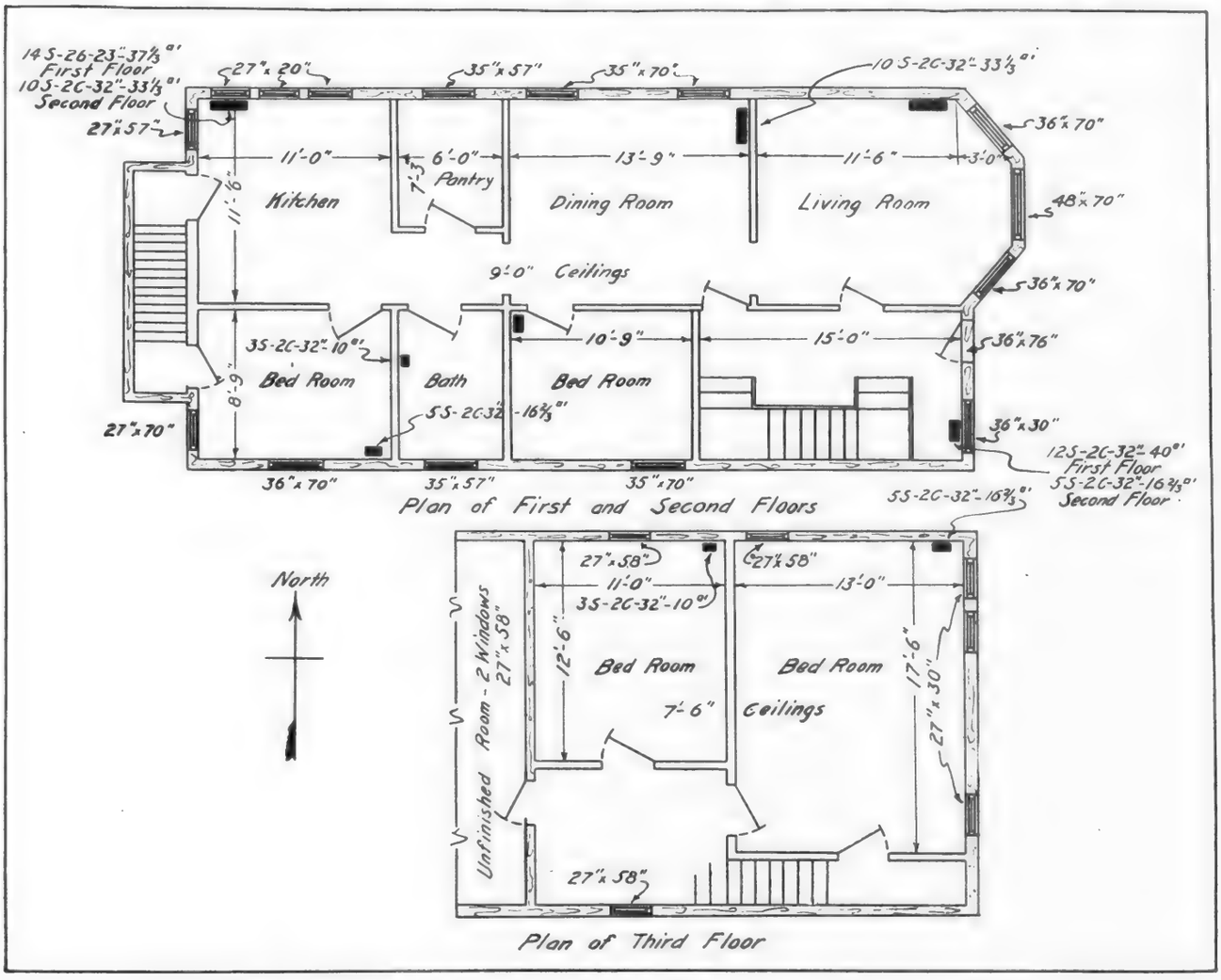
I occupy a first-floor apartment and have been unable to agree with the second-floor tenant as to the amount of coal to be furnished by each of us, the house being equipped with only one boiler. First and second-floor apartments are alike, with the same number of windows, doors and total radiation, although the second-floor tenant also occupies two rooms on the third or attic floor.

Suppose each were given a separate heating plant. In this event, should the present boiler be used for first floor or for the second floor and what would be the rating of the additional boiler? The cost of the piping would probably be small in amount as the present radiators could be used as well as some of the pipe now in place. I maintain that the present boiler is too small for the entire house.

Newark, N. J. J. J. S.

Various approximate methods of calculation would give an apparently fair solution of this problem, but a more detailed and logical method will give results which are more accurate. A rough adjustment could be made based on the proportion each tenant has of: (a) number of rooms occupied, (b) cubic contents of space heated, (c) floor area, (d) exterior heat-losing surface, (e) thermal transmission from exterior heat-losing surface, (f) square-feet of radiation installed, or (g) actual thermal transmission from radiation installed when standing in 70° air.

Calling the first floor "A" and the second floor "B" we would find that the tenant in "A" should pay only: (a) 42%, (b) 40.5%, (c) 38%, (d) 33%, (e) 44%, (f) 50% or (g) 49%. An average of these would be 43% whereas the actual amount which the tenant in "A" should pay is 49% as will be shown by a calculation which apparently is quite complex, but, in reality, simple. Incidentally, this method is of interest, aside from a determination of this question, as it shows what the resulting temperatures will be in each apartment



How Should Tenants Divide Cost of Fuel in This Two-Apartment House?

when the outside temperature is zero.

Each tenant has the same amount of radiation in his apartment, but the dimensions of some of the radiators vary in one apartment from those in the other, consequently the actual heat emission will vary, according to tables in the A.S.H.V.E. *Guide*. Thus the "A" radiators, plus the "B" pipe *risers in "A" apartment, give off a total of (46787 + 6138) = 52925 B.T.U. and the "B" radiators, a total of 48575 B.T.U., when standing in room air at a temperature of 70°.

Now the heat required to warm these apartments to 70°, with an outside temperature of zero, is 50,400 B.T.U. for "A" and 64,820 B.T.U. for "B". Hence, in zero weather, "A" apartment will be slightly overheated and "B" apartment much underheated. This will bring about a change in the thermal emission from the radiators, decreasing such emission as the room temperature rises above 70° and increasing it as the room temperature falls below 70°, the exact amount depending upon the variation of the temperature difference between the steam in the radiators and air in the rooms from that of the standard temperature-difference, i.e., 145°.

This difference, when divided into the total transmission from the radiators in 70° air, will give the total increase or decrease in thermal emission from the radiators, per degree of variation from the standard temperature difference, or 365 B.T.U. for "A" and 335 B.T.U. for "B"; assuming each room of an apartment to be underheated or overheated to the same extent. These figures should further be increased or decreased, due to the fact that the rate of emission from the radiation varies not only directly as the temperature difference changes, but also by an additional factor of 2% for each 10° variation from the standard temperature difference.

THERMAL LOSS THROUGH CEILING

Another factor to be taken into account in our calculation is the thermal loss through "A" ceiling to "B" apartment, as "B" apartment is at a lower temperature than "A" apartment. This easily can be determined from known coefficients of heat losses through floor construction, as 200 B.T.U. per degree of temperature difference between "A" and "B" apartments.

So now we are ready to proceed with a formula which will equate the heat transmission from the radiators and pipes and the interchange of heat between apartments, to the apartment heat losses, and so enable the room temperature of each apartment to be determined. If we let "a" equal the degree of temperature above 70° for "A" apartment and "b" equal the degree of temperature below 70° for "B" apartment, then the temperature in "A" apartment, with an outside temperature of zero, is 60° and in "B" apartment 70.5°. This is determined as follows:

Apartment "B"

$$(335 + **2\%)\ (145 + b) + [200\ (a + b)] = 64820 - ***926\ b$$

$$49590 + 342\ b + 200\ b + 200\ a + 926\ b = 64820$$

$$200\ a = 15230 - 1468\ b$$

$$a = 76.15 - 7.34\ b$$

Apartment "A"

$$365\ (145 - a) = [200\ (b + a)] + 50400 + ***720\ a$$

$$52925 - 365\ b - 200\ b - 200\ a - 720\ a = 50400 - 200\ b$$

$$= -2525 + 1285\ a$$

$$b = 12.63 - 6.43\ a$$

Then

$$b = 12.63 - [6.43\ (76.15 - 7.34\ b)]$$

$$b = 12.63 - 489.64 + 47.16\ b$$

$$46.2\ b = 477$$

$$b = 10.32$$

$$a = 76.15 - [7.34\ (10.32)]$$

$$a = 0.40$$

If the values as determined for "a" and "b" are substituted in the above formulae it will be found that in the case of "B" apartment the heat received hourly from the radiators, when in a room temperature of 60°, added to the heat received hourly from the first-floor apartment equals 55,263 B.T.U., and that this amount of heat equals the heat losses from the apartment when the inside temperature is 60° and the outside temperature is zero. Similarly, during this time the radiators and pipes in "A" apartment transmit 52,780 B.T.U., of which only 50,400 B.T.U. would be required for heating the apartment if the apartment above were heated to 70° instead of to 60°. Therefore,

$$\frac{50{,}400 \times 100}{55{,}263 + 50{,}400} = 48\%,$$

the percentage of the total cost to be paid by "A" when the outside temperature is zero.

However, whenever the outside temperature is [(335 × 145) ÷ 926] — 70 = 18°, or above, the radiation in "B" apartment is sufficient to maintain 70° in the apartment, making the percentage of the total cost only

$$\frac{720 \times 100}{926 + 720} = 44\%$$

as in (e), and this percentage would be closer to the yearly average percentage which should be paid, as the average outside temperature in a heating season is 35° in this climate.

ALLOWANCE FOR OVERHEATING IN MILD WEATHER

On the other hand, the radiators tend to overheat the apartments at outside temperatures of 18° and above, causing the windows to be opened most of the time during the heating season, providing, of course, the radiators are not manually or otherwise controlled so as to prevent this wastage of heat. Therefore, in the absence of such control, the true average percentage would be that obtained by taking into account, as in (g), the actual thermal transmission from the radiation when standing in 70° air, or

$$\frac{46{,}787 \times 100}{48{,}575 + 46{,}787} = 49\%$$

Thus, curiously enough, the answer works out nearly to a "fifty-fifty" basis for each tenant, irrespective of any difference in the amount of heat transmission from either the radiators or the apartments, due to the fact that any one condition offsets, to a certain extent, some other condition.

In passing, it may be pointed out that the tenant occupying the lower floor does not have to start up his heating system so early in the fall if he but holds out long enough for the other tenant to get his system under way first, because the heat from the piping leading to the upper floor is sufficient to heat the lower floor in very mild weather. This works just the other way around if the first-floor tenant starts up his system first, due to warming of the floor of the upper apartment from the lower apartment. Incidentally, the floor of the lower apartment is warmed by the heat given off from the boilers as well as by that portion of the piping of each system which is located in the basement and first floor apartment.

Two small boilers of suitable size are not as cheap as one large boiler, not only because the material and installation costs for the two boilers are greater, but also because a smoke-pipe, a costly separate flue and steam and cold-water connections are required for each boiler. Neither is the operation as economical, considering that there will be the loss resulting from two fires as compared to one, for example; the heat loss by radiation from the two boilers, the coal in the ash and the heat lost to the outside by way of two flues. Greater space and more labor for firing also would be required, while the cost for piping would be greater due to the fact that the basement piping is doubled in amount, yet without substantial reduction in pipe size.

The size of grate in the present boiler should have been stated: If it has an area of 1.45 sq. ft., if the boiler is clean and in proper condition and connected to an 8 in. x 8 in. flue 30 ft. high, it should be able to heat either apartment. Of course, the boiler having the larger grate should be used for the upper apartment, other conditions of each boiler being equal. If one large boiler is used, it should have a grate area of 2.57 sq. ft. and an 8 in. x 12 in. flue, 35 ft. high.

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*Assuming six risers of proper size to allow for radiation installed and allowing for the increased thermal transmission of bare pipe over that of cast-iron column radiation.

**As arbitrarily used for a previously assumed 10° variation from the standard temperature difference. The formula would be too complex if this factor were computed rather than assumed; in any event, further refinement would not materially affect the results.

*** $\frac{64{,}820}{70 - 0}$ = 926 B.T.U. lost from apartment "B", per degree of temperature difference. Likewise, $\frac{50{,}400}{70}$ = 720 B.T.U. lost from apartment "A".

The proper grate size for the one large boiler is determined as follows:

$$\frac{[480 + (480 \times 0.25)] \times 240}{8{,}000 \times 7} = 2.57$$

Where:

480 = equivalent net radiation
(480 × 0.25) = allowance for piping
240 = emission per sq. ft. of radiation
8000 = heat (B.T.U.) realized per pound of coal burned
7 = pounds coal burned per square foot of grate surface per hour in zero weather.

Note that the total actual radiation installed is only 374 sq. ft., but that the loss from this radiation is equivalent to 480 sq. ft. at 240 B.T.U., due to the variable size of the radiators and the fact that their condensing capacity is increased when standing in other than 70° air.

Reason for Terminating a Steam Main Full Size Below Water Line

EDITOR HEATING AND VENTILATING MAGAZINE:

Why do some specifications call for the steam-heat mains to be extended without reduction in pipe size to the point where they drop wet and further to continue this size to a point below water line? Quite often the fulfillment of this clause causes a rather long run of large-sized pipe, fittings and covering, which is all very expensive and also causes an additional loss of heat due to the greater perimeter of the larger pipe.

In view of these facts why not use a reducing ell at the point where the main drops wet, or where "B," as noted in the accompanying sketch, is a considerable distance—why not use a reducing ell at say, 2 ft. beyond the last connection? This method as shown dotted should drip the main equally as well.

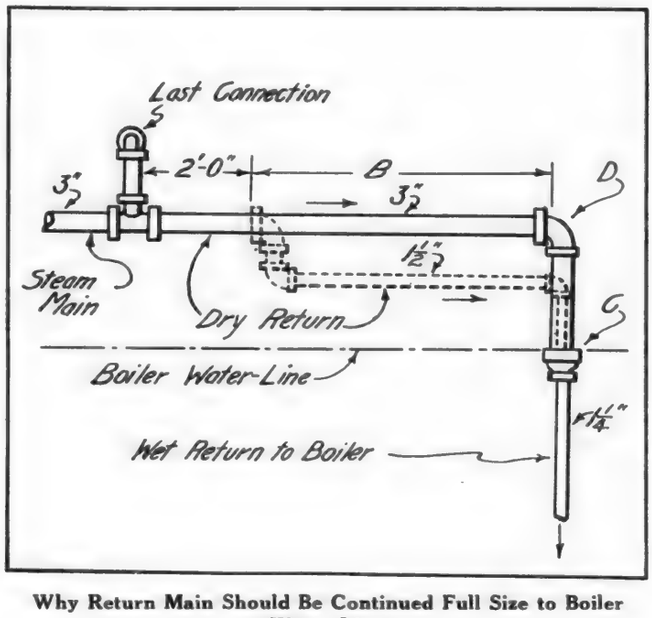
Springfield, Mass. J. A. M.

The correspondent has quite a bit of logic on his side, especially when the main is well over 24 in. above the boiler water-line and therefore not likely to have water back into it from the return. If the designer always were certain that the distance above water line would be ample, and that sufficient head room under the main would be secured, he might waive the above-mentioned clause. However, he is never sure of this nor is it advisable to limit the pitch of the main by decreasing the available head room below the main shown dotted in the sketch.

Piping as shown in solid lines represents good practice and gives a greater factor of safety where the distance above water line is not all that it should be. For example, as the water surges back from the boiler it meets an enlarged pipe area at "C" which will take care of the rebound without allowing it to lift to the main above, simply because of the fact that the vertical pipe can contain a greater volume of back-up water than if it had been reduced at "D" immediately above.

A rather violent backward surge of water from the boiler, as might occur when the system is first heating up from cold, might easily rise to the pipe shown dotted and fill it, due to its reduction in diameter, whereas the 3-in. pipe is at a higher elevation and would have room for both steam and back-water; in such a system there would be less likelihood of water-hammer, or of water causing trouble at the last connection. Furthermore, a dry return must be of sufficient size to pass both steam and water, as steam will, of course, enter a dry return and take up much of its area, due to the greater volume of the steam.

There will be less tendency to surging in a large-sized pipe as there is more air in the pipe to be compressed, thus causing the motion of the water, as it surges, to be more slowly arrested. Incidentally, the main shown in the sketch is of 3-in. size, a size which should not be reduced in a one-pipe steam heating system. For example, if the load on the last few connections permits of a smaller size than that required for the connections previously taken off, it is better to maintain the previous size than to reduce the main before the last connections and drip at the point of reduction. Of course, an eccentric fitting can be used where reduction in pipe size is made, but such fittings are hard to obtain and seldom are installed, even when called for.

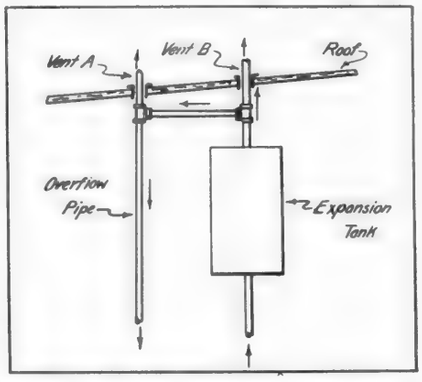


Why Return Main Should Be Continued Full Size to Boiler Water Line

Best Location for Vent Pipe on Expansion Tank

EDITOR HEATING AND VENTILATING MAGAZINE:

Will you kindly advise the best location for the vent pipe on an open expansion tank in a water heating system?



Sketch Showing Methods of Venting Expansion Tanks

Should the tank be vented at "A," as shown in the accompanying sketch, in order to prevent water from siphoning over, or will the location "B" serve equally well?

Detroit, Mich. J. R. S.

Each location is just as effective in the prevention of siphonic action, but midway between the two is perhaps somewhat better as the injector-like action of water flowing horizontally past the vertical connecting vent pipe would induce air down the vent pipe.

If the vent pipe is located at "B" it will waste slightly more hot vapor from the tank and the vapor condensing in this pipe may freeze and fill up the pipe. More hot water also would be wasted and spilled through the vent whenever the system suddenly bubbles or boils over. The velocity of outflow then would be directly upward whereas, with the vent located at "A," the motion of the water would be arrested and changed in direction at a point where the tendency to further flow is greatest in the downward direction. This is a further reason for locating the vent pipe midway between points "A" and "B" in preference to either "A" or "B".

How to Use the Syracuse Table

Figure from the plans the number of square feet of wall, glass and lineal feet of crack for each exposure. Find the nearest corresponding quantity in appropriate column. Then read horizontally to extreme right- or left-hand column for square feet of radiation required. Add additional amount for exposure, as shown in upper right-hand square of data sheet.

For example, for Syracuse, N. Y.: 70 sq. ft. of 12-in. brick wall. Read down the column headed "Plain Brick 12-in."; the nearest corresponding figure in the table is 70.0. Following horizontally to extreme left or right shows 7 sq. ft. of 38-in. 3-col. radiation. If the wall faces north, multiply by 1.1, making 7.7 sq. ft. actually required.

If the same wall has 30 sq. ft. of glass or door, the corresponding figure in the table under "Glass" is 29.2, or the equivalent of 10 sq. ft. This figure, multiplied by exposure factor 1.1, equals 11.0 sq. ft. If the window has 39 lin. ft. of crack and is double hung wood sash, without weather strips, the corresponding figure in the table (using the column headed "50" under "Infiltration") is 39.3, or the equivalent of 11 sq.ft. of radiation. Multiplying by 1.1 for exposure equals 12.1 sq. ft. of radiation.

The three quantities—7.7, 11.0 and 12.1—equal 30.8, or, for simplicity, 31 sq. ft. as the total radiation required for this exposure. The three quantities for any one exposure can be added together and then multiplied by the exposure factor to obtain the same result. No exposure factor is to be used for roofs, floors, ceilings, or partitions or skylights unless skylights are practically vertical.

The factor in the last column is the number of B.T.U. per lineal foot of crack per hour per degree difference in temperature.

How to Use the Richmond Table

Figure from the plans the number of square feet of wall, glass and lineal feet of crack for each exposure. Find the nearest corresponding quantity in appropriate column. Then read horizontally to extreme right- or left-hand column for square feet of radiation required. Add additional amount for exposure, as shown in upper right-hand square of data sheet.

For example, for Richmond, Va.: 70 sq. ft. of 12-in. brick wall. Read down the column headed, "Plain Brick 12-in."; the nearest corresponding figure in the table is 70.4. Following horizontally to extreme left or right shows 4 sq. ft. of 38-in. 3-col. radiation. If the wall faces north, multiply by 1.35, making 5.4 sq. ft. actually required.

If the same wall has 30 sq. ft. of glass or door, the corresponding figure in the table under "Glass" is 30.7, or the equivalent of 6 sq. ft. This figure, multiplied by exposure factor 1.35, equals 8.1 sq. ft. If the window has 39 lin. ft. of crack and is double hung wood sash, without weather strips, the corresponding figure in the table (using the column headed "50" under "Infiltration") falls between 37.5 and 43.8, or the equivalent of 6.5 sq. ft. of radiation. Multiplying by 1.35 for exposure equals 8.77 sq. ft. of radiation.

The three quantities—5.4, 8.1 and 8.77—equal 20.27, or, for simplicity, 20 sq. ft. as the total radiation required for this exposure. The three quantities for any one exposure can be added together and then multiplied by the exposure factor to obtain the same result. No exposure factor is to be used for roofs, floors, ceilings, or partitions or skylights unless skylights are practically vertical.

The factor in the last column is the number of B.T.U. per lineal foot of crack per hour per degree difference in temperature.

INFILTRATION

Stationary Wood Sash	25	French Doors	100
Double Hung Wood Sash	50	Outside Doors	200
Double Hung Steel Sash	100	Outside Doors with Storm Doors	100
Casement Windows	100	Outside Doors with	
Fenestra	100	Inner Vestibule Doors	100

Metal Weather Strip Deducts 50%

HEATING AND PIPING CONTRACTORS NA

STANDARD RADIATION ESTIMAT

SHOWING RADIATION REQUIRED FOR QUANT

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3 Col 38" St'm Rad	GLASS		INFILTRATION				OUTSIDE WALLS																	
	Win. or Door	Sky Light	Rate per Lin. Ft.				Plain Brick			Brick and Pl.			Brick Fur. L. P.			Br. 4" Tile Pl.			Plain Conc.			Conc. Fur L. P.		
			25	50	100	200	8"	12"	16"	8"	12"	16"	8"	12"	16"	4"	8"	12"	8"	12"	16"	8"	12"	16"
	1.1	1.3	0.45	0.9	1.8	3.6	.42	.32	.26	.38	.29	.25	.27	.23	.21	.30	.26	.22	.60	.48	.41	.50	.40	.34
225	77.0	91.0	31.5	63.0	126	252	29.4	22.4	18.2	26.6	20.3	17.5	18.9	16.1	14.7	21.0	18.2	15.4	42.0	33.6	28.7	35.0	28.0	23.
1	2.92	2.47	7.14	3.57	1.79	.89	7.7	10.0	12.4	8.5	11.1	12.9	11.9	14.0	15.3	10.7	12.4	14.6	5.4	6.7	7.8	6.4	8.0	9.
2	5.84	4.94	14.3	7.14	3.58	1.78	15.4	20.0	24.8	17.0	22.2	25.8	23.8	28.0	30.6	21.4	24.8	29.2	10.8	13.4	15.6	12.8	16.0	19.
3	8.76	7.41	21.4	10.7	5.37	2.67	23.1	30.0	37.2	25.5	33.3	38.7	35.7	42.0	45.9	32.1	37.2	43.8	16.2	20.1	23.4	19.2	24.0	28.
4	11.7	9.88	28.6	14.2	7.16	3.56	30.8	40.0	49.6	34.0	44.4	51.6	47.6	56.0	61.2	42.8	49.6	58.4	21.6	26.8	31.2	25.6	32.0	38.
5	14.6	12.4	35.7	17.9	8.95	4.45	38.5	50.0	62.0	42.5	55.5	64.5	59.5	70.0	76.5	53.5	62.0	73.0	27.0	33.5	39.0	32.0	40.0	47.
6	17.5	14.8	42.8	21.4	10.7	5.34	46.2	60.0	74.4	51.0	66.6	77.4	71.4	84.0	91.8	64.2	74.4	87.6	32.4	40.2	46.8	38.4	48.0	57.
7	20.4	17.3	49.9	25.0	12.5	6.23	53.9	70.0	86.8	59.5	77.7	90.3	83.3	98.0	107	74.9	86.8	102	37.8	46.9	54.6	44.8	56.0	66.
8	23.4	19.8	57.1	28.6	14.3	7.12	61.6	80.0	99.2	68.0	88.8	103	95.2	112	122	85.6	99.2	117	43.2	53.6	62.4	51.2	64.0	76.
9	26.3	22.2	64.3	32.1	16.1	8.01	69.3	90.0	112	76.5	99.9	116	107	126	138	96.3	112	131	48.6	60.3	70.2	57.6	72.0	85.
10	29.2	24.7	71.4	35.7	17.9	8.90	77.0	100	124	85.0	111	129	119	140	153	107	124	146	54.0	67.0	78.0	64.0	80.0	95.
11	32.1	27.2	78.5	39.3	19.7	9.79	84.7	110	136	93.5	122	142	131	154	168	118	136	161	59.4	73.7	85.8	70.4	88.0	1
12	35.0	29.6	85.7	42.8	21.5	10.7	92.4	120	149	102	133	155	143	168	184	128	149	175	64.8	80.4	93.6	76.8	96.0	1
13	38.0	32.1	92.8	46.4	23.2	11.6	100	130	161	111	144	168	155	182	199	139	161	190	70.2	87.1	101	83.2	104	1
14	40.9	34.6	100	50.0	25.1	12.5	108	140	174	119	155	181	167	196	214	150	174	204	75.6	93.8	109	89.6	112	1
15	43.8	37.1	107	53.6	26.9	13.4	116	150	186	128	167	194	179	210	230	161	186	219	81.0	101	117	96.0	120	1
16	46.7	39.5	114	57.1	28.6	14.2	123	160	198	136	178	206	190	224	245	171	198	234	86.4	107	125	102	128	1
17	49.6	42.0	121	60.7	30.4	15.1	131	170	211	145	189	219	202	238	260	182	211	248	91.8	114	133	109	136	1
18	52.6	44.5	129	64.3	32.2	16.0	139	180	223	153	200	232	214	252	275	193	223	263	97.2	121	140	115	144	1
19	55.5	46.9	136	67.9	34.0	16.9	146	190	236	162	211	245	226	266	291	203	236	277	103	127	148	122	152	1
20	58.4	49.4	143	71.4	35.8	17.8	154	200	248	170	222	258	238	280	306	214	248	292	108	134	156	128	160	1
21	61.3	51.9	150	75.0	37.6	18.7	162	210	260	179	233	271	250	294	321	225	260	307	113	141	164	134	168	2
22	64.2	54.3	157	78.5	39.4	19.6	169	220	273	187	244	284	262	308	337	235	273	321	119	147	172	141	176	2
23	67.2	56.8	164	82.1	41.2	20.5	177	230	285	196	255	297	274	322	352	246	285	336	124	154	179	147	184	2
24	70.8	59.3	171	85.7	43.0	21.4	185	240	298	204	266	310	286	336	367	257	298	350	130	161	187	154	192	2
25	73.0	61.8	179	89.3	44.8	22.3	193	250	310	213	278	323	298	350	383	268	310	365	135	168	195	160	200	2

INFILTRATION

Stationary Wood Sash	25	French Doors	100
Double Hung Wood Sash	50	Outside Doors	200
Double Hung Steel Sash	100	Outside Doors with Storm Doors	100
Casement Windows	100	Outside Doors with	
Fenestra	100	Inner Vestibule Doors	100

Metal Weather Strip Deducts 50%

HEATING AND PIPING CONTRACTORS N

STANDARD RADIATION ESTIMAT

SHOWING RADIATION REQUIRED FOR QUAN

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3 Col 38" St'm Rad	GLASS		INFILTRATION				OUTSIDE WALLS																	
	Win. or Door	Sky Light	Rate per Lin. Ft.				Plain Brick			Brick and Pl.			Brick Fur. L. P.			Br. 4" Tile Pl.			Plain Conc.			Conc. Fur L. P		
			25	50	100	200	8"	12"	16"	8"	12"	16"	8"	12"	16"	4"	8"	12"	8"	12"	16"	8"	12"	16
	1.1	1.3	0.45	0.9	1.8	3.6	.42	.32	.26	.38	.29	.25	.27	.23	.21	.30	.26	.22	.60	.48	.41	.50	.40	.3
225	44.0	52.0	18.0	36.0	72.0	144	16.8	12.8	10.4	15.2	11.6	10.0	10.8	9.20	8.40	12.0	10.4	8.80	24.0	19.2	16.4	20.0	16.0	13
1	5.11	4.33	12.5	6.25	3.13	1.56	13.4	17.6	21.6	14.8	19.4	22.5	20.9	24.5	26.8	18.8	21.6	25.6	9.38	11.7	13.7	11.3	14.1	16
2	10.2	8.66	25.0	12.5	6.26	3.12	26.8	35.2	43.2	29.6	38.8	45.0	41.8	49.0	53.6	37.6	43.2	51.2	18.8	23.4	27.4	22.6	28.2	33
3	15.3	13.0	37.5	18.8	9.39	4.68	40.2	52.8	64.8	44.4	58.2	67.5	62.7	73.5	80.4	56.4	64.8	76.8	28.1	35.1	41.1	33.9	42.3	49
4	20.4	17.3	50.0	25.0	12.5	6.24	53.6	70.4	86.4	59.2	77.6	90.0	83.6	98.0	107	75.2	86.4	102	37.5	46.8	54.8	45.2	56.4	66
5	25.6	21.7	62.5	31.3	15.7	7.80	67.0	88.0	108	74.0	97.0	113	105	123	134	94.0	108	128	46.9	58.5	68.5	56.5	70.5	83
6	30.7	26.0	75.0	37.5	18.8	9.36	80.4	106	130	88.8	116	135	125	147	161	113	130	154	56.3	70.2	82.2	67.8	84.6	99
7	35.8	30.3	87.5	43.8	21.9	10.9	93.8	123	151	104	136	158	146	172	188	132	151	179	65.7	81.9	95.9	79.1	98.7	1
8	40.9	34.6	100	50.0	25.0	12.5	107	141	173	118	155	180	167	196	214	150	173	205	75.0	93.6	110	90.4	113	1
9	46.0	39.0	113	56.3	28.2	14.0	121	158	194	133	175	203	188	221	241	169	194	230	84.4	105	123	102	127	1
10	51.1	43.3	125	62.5	31.3	15.6	134	176	216	148	194	225	209	245	268	188	216	256	93.8	117	137	113	141	1
11	56.2	47.6	138	68.8	34.4	17.2	147	194	238	163	213	248	230	270	295	207	238	282	103	129	151	124	155	1
12	61.3	52.0	150	75.0	37.6	18.7	161	211	259	178	233	270	251	294	322	226	259	307	113	140	164	136	169	1
13	66.4	56.3	163	81.3	40.7	20.3	174	229	281	192	252	293	272	319	348	244	281	333	122	152	178	147	183	2
14	71.5	60.6	175	87.5	43.8	21.8	188	246	302	207	271	315	293	343	375	263	302	358	131	164	192	158	197	2
15	76.7	65.0	188	93.8	47.0	23.4	201	264	324	222	291	338	314	368	402	282	324	384	141	176	206	170	212	2
16	81.8	69.3	200	100	50.0	25.0	214	282	346	237	310	360	334	392	429	301	346	410	150	187	219	181	226	2
17	86.9	73.6	213	106	53.2	26.5	228	299	367	252	330	383	355	417	456	320	367	435	159	199	233	192	240	2
18	92.0	77.9	225	113	56.3	28.1	241	317	389	266	349	405	376	441	482	338	389	461	169	211	247	203	254	2
19	97.1	82.3	238	119	59.5	29.6	255	334	410	281	369	428	397	466	509	357	410	486	178	222	260	215	268	3
20	102	86.6	250	125	62.6	31.2	268	352	432	296	388	450	418	490	536	376	432	512	188	234	274	226	282	3
21	107	90.9	263	131	65.7	32.8	281	370	454	311	407	473	439	515	563	395	454	538	197	246	288	237	296	3
22	112	95.3	275	138	68.9	34.0	295	387	475	326	427	495	460	539	590	414	475	563	206	257	301	249	310	3
23	118	99.6	288	144	72.0	35.9	308	405	497	340	446	518	481	564	616	432	497	589	216	269	315	260	324	3
24	123	104	300	150	75.0	37.4	322	422	518	355	466	540	502	588	643	451	518	614	225	281	329	271	338	3
25	128	108	313	156	78.3	39.0	335	440	540	370	485	563	523	613	670	470	540	640	235	293	343	283	353	4

For Methods of Using Table See Back of Sheet.

ORS NATIONAL ASSOCIATION
STIMATING TABLE
OR QUANTITIES INDICATED

than that Shown See Heating and Piping Contractors National Association Engineering Standards.

SYRACUSE, N. Y.

TEMPERATURE FACTORS		EXPOSURE FACTORS			
Room Temperature	70°=T_i	N	1.10	S	1.05
Base Temperature	0°=T_o	NE	1.00	SW	1.10
Base Temp. 0° Equivalent to		E	1.00	W	1.10
Guarantee Temp. —15° Outside		SE	1.00	NW	1.10

nc. Fur L. P.			ROOF						Base Floor		Interm'e Floor			Ceiling		Partition			Type
	12"	16"	Frame Std.	Frame No Sh'g	Frame No L. P.	T&G on 1" Bd.	T&G on 4" Conc.	Sh'gle on Sh'g	Sh'gle Sh'g L. P.	Conc. on Earth	Wood on Sleep.	4" Conc.	4" Conc. 3" Fill 1" Fin.	Double Wood	Lath and Plas.	L & P Wo. Fl. Over	Stud L & P 1 Side	Stud L & P 2 Side		Kind
	.40	.34	.24	.31	.35	.30	.60	.40	.30	.31	.13	.20	.15	.20	.49	.28	.60	.33		Thick.
																				K
0	28.0	23.8	16.8	21.7	24.5	21.0	42.0	28.0	21.0	10.9	4.55	7.0	5.25	7.0	17.2	9.8	21.0	11.6		K(Ti-To)
4	8.0	9.5	13.4	10.4	9.2	10.7	5.4	8.0	10.7	20.7	49.5	32.2	42.9	32.2	13.1	23.0	10.7	19.4		1
8	16.0	19.0	26.8	20.8	18.4	21.4	10.8	16.0	21.4	41.4	99.0	64.4	85.8	64.4	26.2	46.0	21.4	38.8		2
2	24.0	28.5	40.2	31.2	27.6	32.1	16.2	24.0	32.1	62.1	149	96.6	129	96.6	39.3	69.0	32.1	58.2		3
6	32.0	38.0	53.6	41.6	36.8	42.8	21.6	32.0	42.8	82.8	198	129	172	129	52.4	92.0	42.8	77.6		4
0	40.0	47.5	67.0	52.0	46.0	53.5	27.0	40.0	53.5	104	248	161	215	161	65.5	115	53.5	97.0		5
4	48.0	57.0	80.4	62.4	55.2	64.2	32.4	48.0	64.2	124	297	193	257	193	78.6	138	64.2	116		6
8	56.0	66.5	93.8	72.8	64.4	74.9	37.8	56.0	74.9	145	347	225	300	225	91.7	161	74.9	136		7
2	64.0	76.0	107	83.2	73.6	85.6	43.2	64.0	85.6	166	396	258	343	258	105	184	85.6	155		8
6	72.0	85.5	121	93.6	82.8	96.3	48.6	72.0	96.3	186	446	290	386	290	118	207	96.3	175		9
0	80.0	95.0	134	104	92.0	107	54.0	80.0	107	207	495	322	429	322	131	230	107	194		10
4	88.0	105	147	114	101	118	59.4	88.0	118	228	545	354	472	354	144	253	118	213		11
8	96.0	114	161	125	110	128	64.8	96.0	128	248	594	386	515	386	157	276	128	233		12
2	104	124	174	135	120	139	70.2	104	139	269	644	419	558	419	170	299	139	252		13
6	112	133	188	146	129	150	75.6	112	150	290	693	451	601	451	183	322	150	272		14
0	120	143	201	156	138	161	81.0	120	161	311	743	483	644	483	196	345	161	291		15
02	128	152	214	166	147	171	86.4	128	171	331	792	515	686	515	209	368	171	310		16
09	136	162	228	177	156	182	91.8	136	182	352	842	547	729	547	223	391	182	330		17
15	144	171	241	187	166	193	97.2	144	193	373	891	580	772	580	236	414	193	349		18
22	152	181	255	198	175	203	103	152	203	393	941	612	815	612	249	437	203	369		19
28	160	190	268	208	184	214	108	160	214	414	990	644	858	644	262	460	214	388		20
34	168	200	281	218	193	225	113	168	225	435	1040	676	901	676	275	483	225	407		21
41	176	209	295	229	202	235	119	176	235	455	1089	708	944	708	288	506	235	427		22
47	184	219	308	239	212	246	124	184	246	476	1139	741	987	741	301	529	246	446		23
54	192	228	322	250	221	257	130	192	257	497	1188	773	1030	773	314	552	257	466		24
60	200	238	355	260	230	268	135	200	268	518	1238	805	1073	805	327	575	268	485		25

←These Items Figured on Basis of K $\left(\frac{T_i-T_o}{2}\right)$→

ORS NATIONAL ASSOCIATION
ESTIMATING TABLE
OR QUANTITIES INDICATED

n than that Shown SeeHeating and Piping Contractors National Association Engineering Standards.

RICHMOND, VIRGINIA

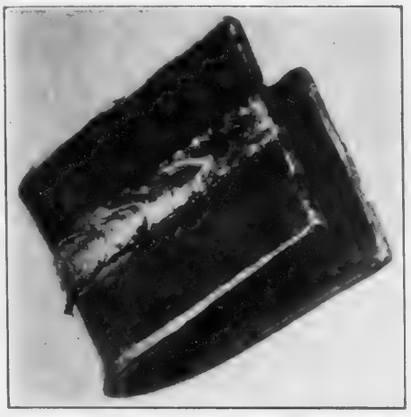
TEMPERATURE FACTORS		EXPOSURE FACTORS			
Room Temperature	70°=T_i	N	1.35	S	1.30
Base Temperature	+30°=T_o	NE	1.25	SW	1.30
Base Temp. +30° Equivalent to		E	1.25	W	1.35
Guarantee Temp. of +15° Outside		SE	1.00	NW	1.35

nc. Fur L. P.			ROOF						Base Floor		Interm'e Floor			Ceiling		Partition			Type
"	12"	16"	Frame Std.	Frame No Sh'g	Frame No L. P.	T&G on 1" Bd.	T&G on 4" Conc.	Sh'gle on Sh'g	Sh'gle Sh'g L. P.	Conc. on Earth	Wood on Sleep.	4" Conc.	4" Conc. 3" Fill 1" Fin.	Double Wood	Lath and Plas.	L & P Wo. Fl. Over	Stud L & P 1 Side	Stud L & P 2 Side		Kind
0	.40	.34	.24	.31	.35	.30	.60	.40	.30	.31	.13	.20	.15	.20	.49	.28	.60	.33		Thick.
																				K
.0	16.0	13.6	9.60	12.4	14.0	12.0	24.0	16.0	12.0	6.20	2.60	4.00	3.00	4.00	9.80	5.60	12.0	6.60		K(Ti-To)
.3	14.1	16.6	23.4	18.2	16.1	18.8	9.38	14.1	18.8	36.3	86.5	56.3	75.0	56.3	23.0	40.2	18.8	34.1		1
.6	28.2	33.2	46.8	36.4	32.2	37.6	18.8	28.2	37.6	72.6	173	113	150	113	46.0	80.4	37.6	68.2		2
.9	42.3	49.8	70.2	54.6	48.3	56.4	28.1	42.3	56.4	109	260	169	225	169	69.0	121	56.4	102		3
.2	56.4	66.4	93.6	72.8	64.4	75.2	37.5	56.4	75.2	145	346	225	300	225	92.0	161	75.2	136		4
.5	70.5	83.0	117	91.0	80.5	94.0	46.9	70.5	94.0	182	433	282	375	282	115	201	94.0	171		5
.8	84.6	99.6	140	109	96.6	113	56.3	84.6	113	218	519	338	450	338	138	241	113	205		6
.1	98.7	116	164	127	113	132	65.7	98.7	132	254	606	394	525	394	161	281	132	239		7
.4	113	133	187	146	129	150	75.0	113	150	290	692	450	600	450	184	322	150	273		8
02	127	149	211	164	145	169	84.4	127	169	327	779	507	675	507	207	362	169	307		9
13	141	166	234	182	161	188	93.8	141	188	363	865	563	750	563	230	402	188	341		10
24	155	183	257	200	177	207	103	155	207	399	952	619	825	619	253	442	207	375		11
36	169	199	281	218	193	226	113	169	226	436	1038	676	900	676	276	482	226	409		12
47	183	216	304	237	209	244	122	183	244	472	1125	732	975	732	299	523	244	443		13
58	197	232	328	255	225	263	131	197	263	508	1211	788	1050	788	322	563	263	477		14
70	212	249	351	273	242	282	141	212	282	545	1298	845	1125	845	345	603	282	512		15
81	226	266	374	291	258	301	150	226	301	581	1384	901	1200	901	368	643	301	546		16
92	240	282	398	309	274	320	159	240	320	617	1471	957	1275	957	391	683	320	580		17
03	254	299	421	328	290	338	169	254	338	653	1557	1013	1350	1013	414	724	338	614		18
15	268	315	445	346	306	357	178	268	357	690	1644	1070	1425	1070	437	764	357	648		19
26	282	332	468	364	322	376	188	282	376	726	1730	1126	1500	1126	460	804	376	682		20
37	296	349	491	382	338	395	197	296	395	762	1817	1182	1575	1182	483	844	395	716		21
49	310	365	515	400	354	414	206	310	414	799	1903	1239	1650	1239	506	884	414	750		22
60	324	382	538	419	370	432	216	324	432	835	1990	1295	1725	1295	529	925	433	784		23
71	338	398	562	437	386	451	225	338	451	871	2076	1351	1800	1351	552	965	451	818		24
83	353	415	585	455	403	470	235	353	470	908	2163	1408	1875	1408	575	1005	470	853		25

Data Sheets Nos. 13 M 3 and 13 N 3

←These Items Figured on Basis of K $\left(\frac{T_i-T_o}{2}\right)$→

Electronic-Welded Materials Stand Severe Test



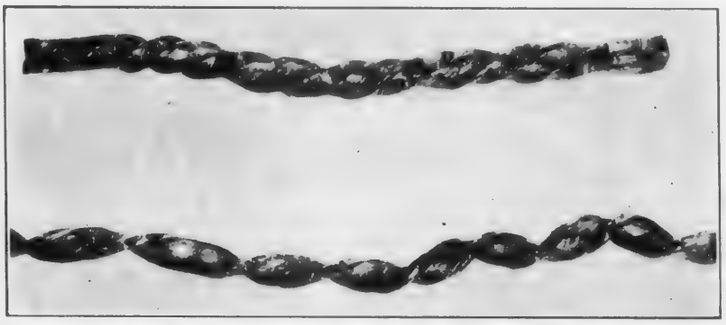
Bending a Welded Plate Shows that the Weld Will Stand this Distortion as Well as the Plate

Applications of the electronic-arc welding process in the field of the boilermaker and heating contractor, have produced results that apparently justify extravagant claims.

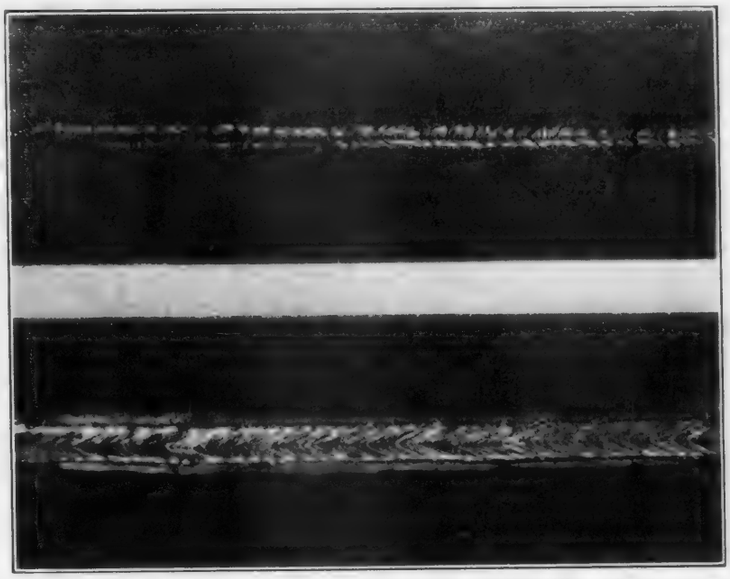
The electric arc is normally a difficult phenomenon to control. It creates its own magnetic field and, in the passage of the welding current through the parts being joined, creates other magnetic fields of variable direction and strength. The uncontrolled arc, therefore, tends to wander about seeking the path of least resistance. By superimposing a strong magnetic field on the arc flame, a control of the arc is established, permitting it to travel through variable fields without disturbance. The arc also is given a gyratory motion at high velocity which also tends to maintain it in a straight line.

Exhaustive tests have been made to determine the strength of weld made by this process, and the illustrations show abnormal distortion of both welding material and welded pieces, indicating that the welded joint is at least equal in strength to the material joined together.

Many Tests for Tensile Strength of Bars Cut to Include a Welded Joint Show that the Weld is Stronger than the Plate; Bars Shown Are from 16 Gauge to ⅛ In.



Metal from a Weld, Similar to those Shown Below, Was Twisted Through 1080 Degrees Without Failing



At the Top Is a Metallic Arc Weld; at the Bottom One Made by the Electronic Tornado. The Uniformity and Smoothness Which the Control of the Arc Has Made Possible Is Shown by this Comparison

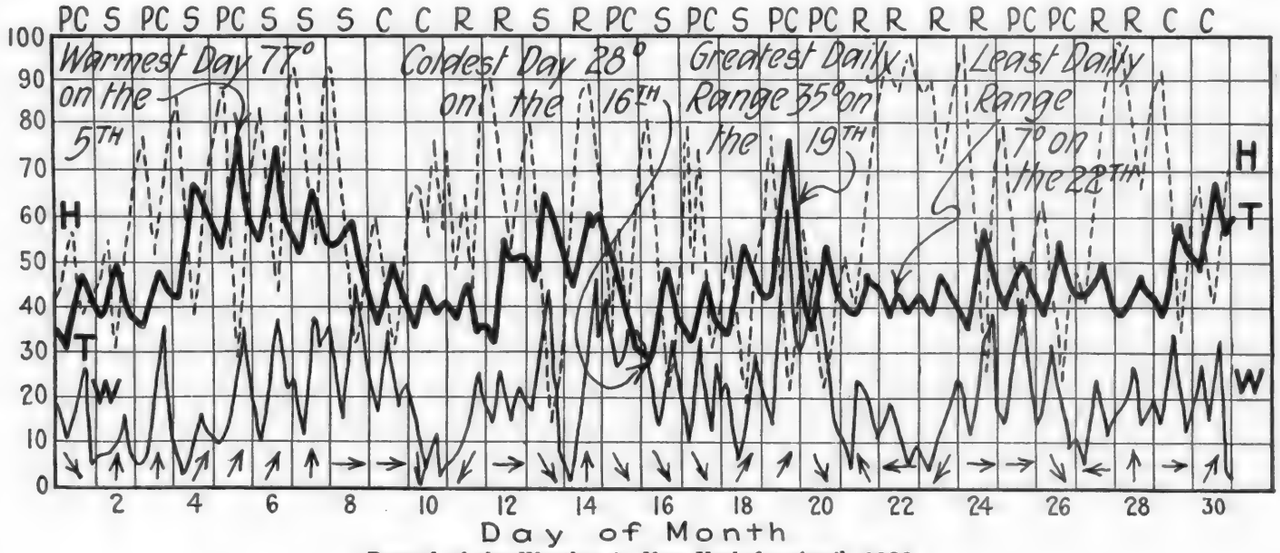
Welds, after having been made, were sawed from the plate of mild steel, and the resultant bars were twisted through three complete revolutions without showing any indication of failure. Other such bars were twisted cold and tied in knots without fracturing. Other test bars cut at right angles to a welded seam were subjected to tensile stress, and the fractures almost invariably were outside of the welded zone.

It is said that the refining effect of the process produces metal in the weld fully as good as that which can be obtained in rolled steel of the same general purity.

Following the development of a manually electronic arc welder, attention was concentrated on machine units for factory fabrication of welded products. Machine welders are built to meet specific requirements, and welding costs are minimized, while production is greatly speeded. One-half inch plate welds, or equivalent, are made at the rate of 40 ft. an hour, at a cost varying from 3 cents to 7 cents per ft. Machines can be equipped with two or more welding heads for simultaneous operation where more than a single weld is to be made on an assembly.

The Weather for April, 1928

	New York	Boston	Pittsburgh	Chicago	St. Louis
Highest temperature, deg. F	77	84	80	75	81
Date of highest temperature	5	5	6	3	29
Lowest temperature, deg. F	28	28	25	23	27
Date of lowest temperature	16	16	16	9	15
Greatest daily range, deg. F	35	42	36	30	32
Date of greatest daily range	19	5	18	2	29
Least daily range, deg. F	7	5	5	5	6
Date of least daily range	22	23	23	22	22
Mean temperature for month, deg. F	47.5	46.8	46.6	44.7	52.4
Normal mean temp. for month, deg. F	49.4	46.4	51.2	46.9	56.1
Total precipitation, this month, in	4.71	4.68	4.05	2.34	3.02
Total snowfall, this month, in	Trace	Trace	4.3	1.0	Trace
Normal precipitation, this month, in	3.23	3.34	2.92	2.78	3.81
Total wind movement, this month, miles	13187	7807	8624	8415	9372
Average hourly wind velocity, miles	18.3	10.8	12.0	11.7	13.0
Prevailing direction of wind	N.W.	W.	W.	N.E.	S.W.
Number of clear days	8	11	1	8	11
Number of partly cloudy days	10	9	10	11	8
Number of cloudy days	12	10	19	11	11
Number of days with precipitation	11	11	14	9	8
Number of days with snow	One	One	3	3	One
Snow on ground at end of month, in	0	0	0	0	None


PC S PC S PC S S S C C R R S R PC S PC S PC PC R R R R PC PC R R C C
Warmest Day 77° on the 5TH
Coldest Day 28° on the 16TH
Greatest Daily Range 35° on the 19TH
Least Daily Range 7° on the 22ND
H
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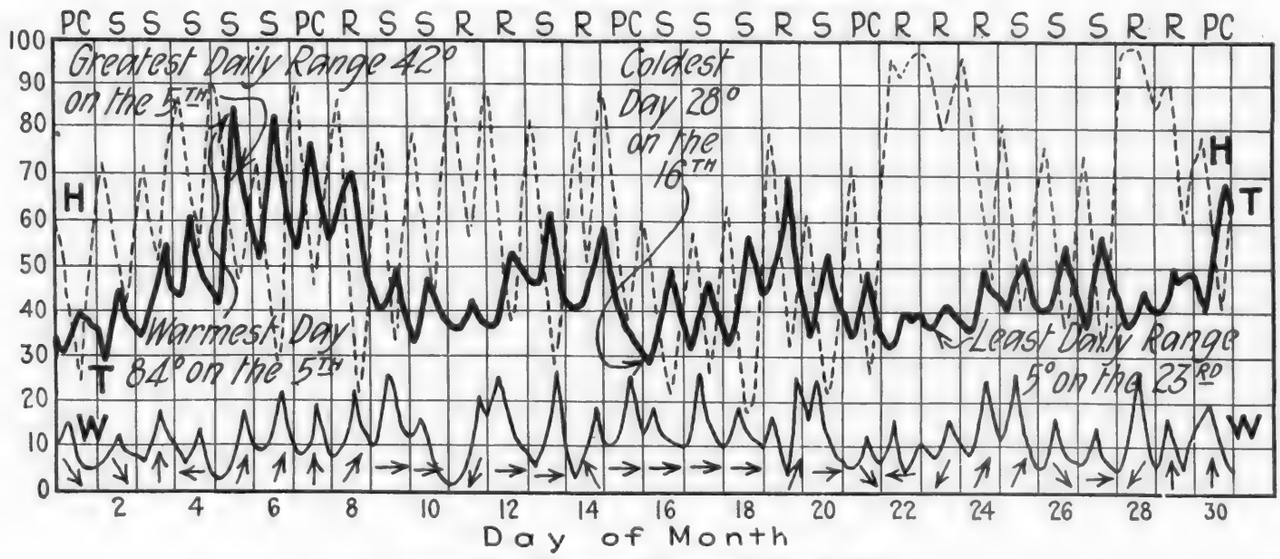
90
80
70
60
50
40
30
20
10
0
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
Day of Month

Record of the Weather in New York for April, 1928
(Hourly Observations of the Relative Humidity Plotted on this Chart)


PC S S S S S PC R S S R R S R PC S S S R S PC R R R S S S R R PC
Greatest Daily Range 42° on the 5TH
Coldest Day 28° on the 16TH
Warmest Day 84° on the 5TH
Least Daily Range 5° on the 23RD
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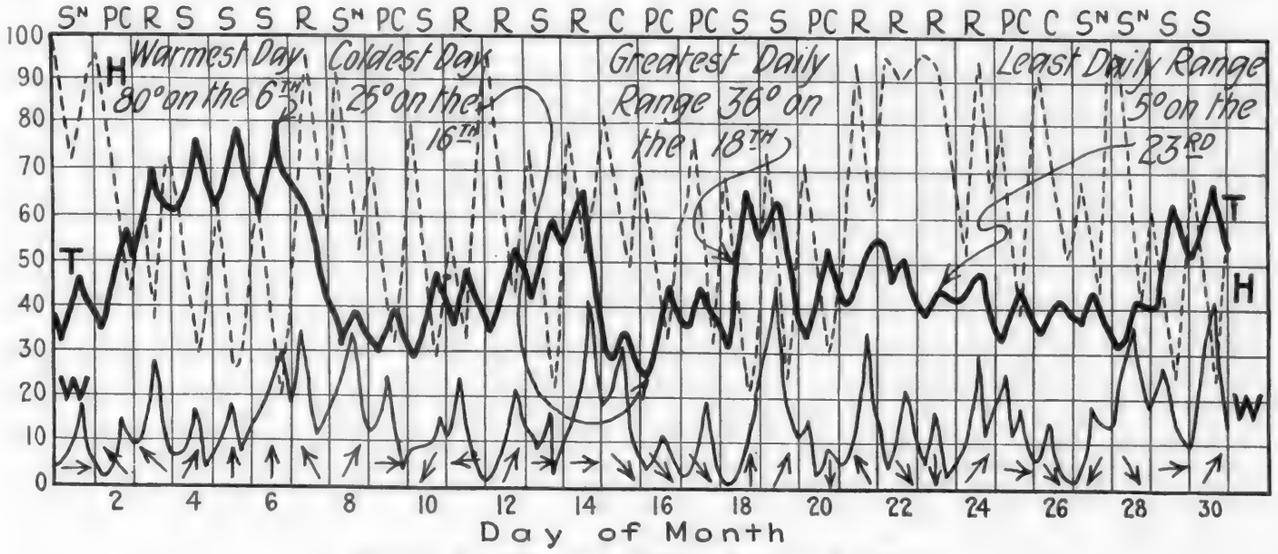
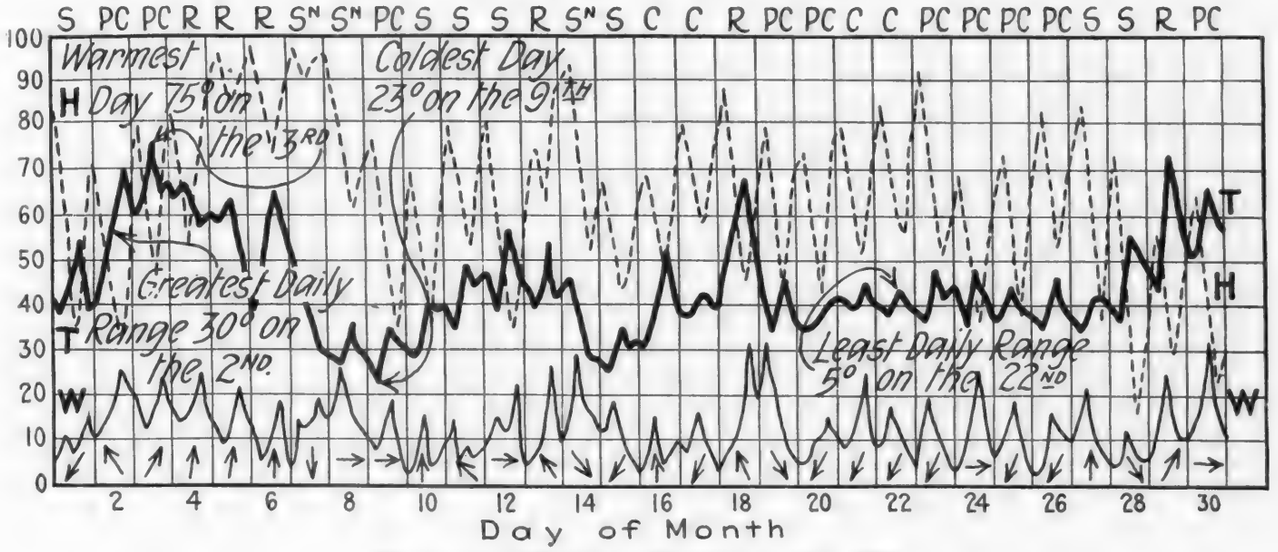
60
50
40
30
20
10
0
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
Day of Month

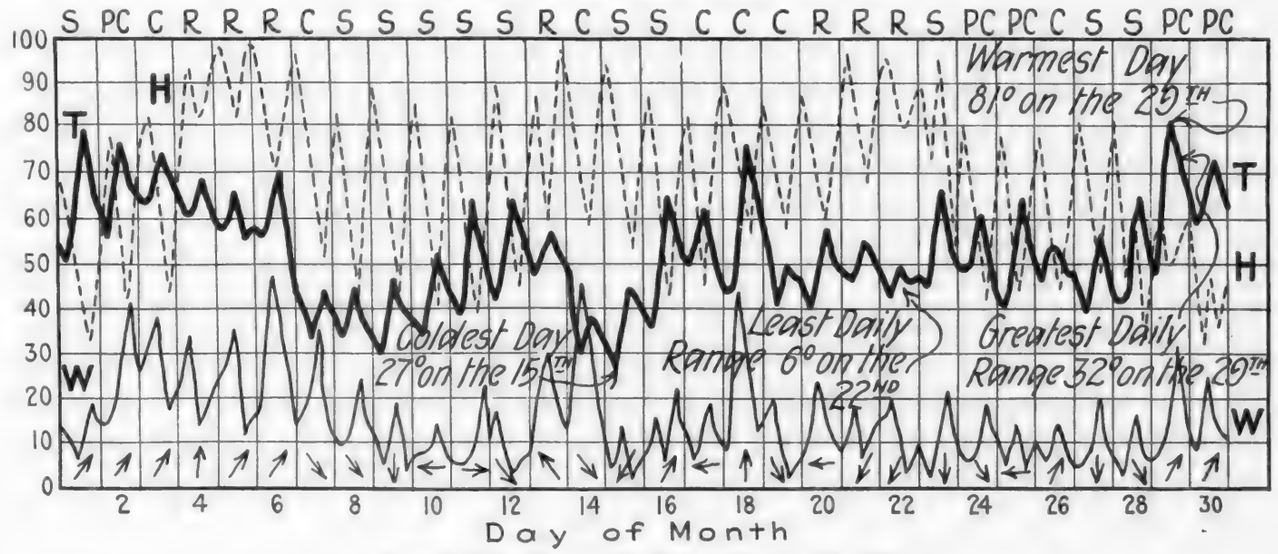
Record of the Weather in Boston for April, 1928


Sn PC R S S S R Sn PC S R R S R C PC PC S S PC R R R R PC C Sn Sn S S
Warmest Day 80° on the 6TH
Coldest Day 25° on the 16TH
Greatest Daily Range 36° on the 18TH
Least Daily Range 5° on the 23RD
H
T
W
100 90 80 70 60 50 40 30 20 10 0
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
Day of Month

Record of the Weather in Pittsburgh for April, 1928


S PC PC R R R Sn Sn PC S S S R Sn S C C R PC PC C C PC PC PC PC S S R PC
Warmest Day 75° on the 3RD
Coldest Day 23° on the 9TH
Greatest Daily Range 30° on the 2ND.
Least Daily Range 5° on the 22ND
H
T
W
100 90 80 70 60 50 40 30 20 10 0
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
Day of Month

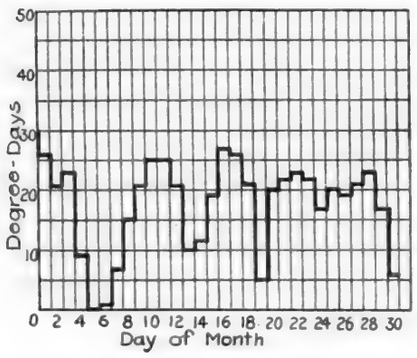
Record of the Weather in Chicago for April, 1928


S PC C R R R C S S S S S R C S S C C C R R R S PC PC C S S PC PC
Warmest Day 81° on the 29TH
Coldest Day 27° on the 15TH
Least Daily Range 6° on the 22ND
Greatest Daily Range 32° on the 29TH
H
T
W
100 90 80 70 60 50 40 30 20 10 0
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
Day of Month

Record of the Weather in St. Louis for April, 1928

Plotted from records especially compiled for THE HEATING AND VENTILATING MAGAZINE by the United States Weather Bureau.
Heavy lines indicate temperatures in degree F. Light lines indicate wind in miles per hour.
Broken lines indicate humidity in percentage from readings at 8 A.M., 12 M., and 8 P.M. Arrows fly with prevailing directions of wind.
C—clear, PC—partly cloudy, C—cloudy, R—rain, Sn—snow.

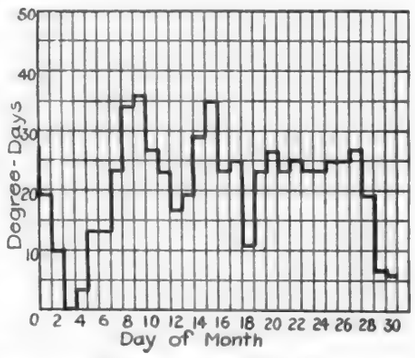
Monthly Heating Loads in Degree-Days In Five Typical Cities



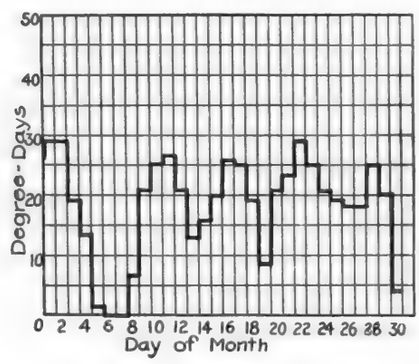
New York, April, 1928
Degree-Days 524—Degree-Days to April 30, 4130

PRACTICAL use may be made of these charts in almost every phase of the heating industry. The first chart appeared in the December, 1927, issue and they will be continued throughout the heating season. They show graphically the heating load in five cities in the United States as typical of the entire range in heating loads.

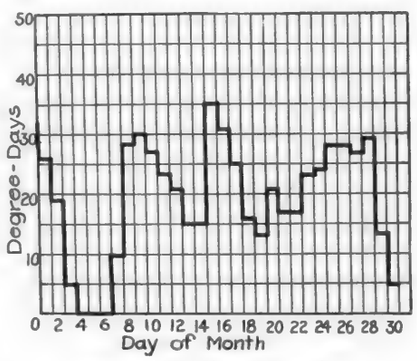
These charts are so drawn that they can be cut out and pasted end-to-end, giving the complete yearly heating load for any of the cities represented. An outline of the method of measuring the heating load by degree-days and illustrations of the varied applications will be found in THE HEATING AND VENTILATING MAGAZINE for September and November, 1925.



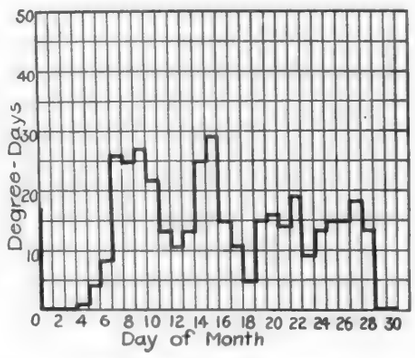
Chicago, April, 1928
Degree-Days 613—Degree-Days to April 30, 4897



Boston, April, 1928
Degree-Days 548—Degree-Days to April 30, 4336



Pittsburgh, April, 1928
Degree-Days 568—Degree-Days to April 30, 4368



St. Louis, April, 1928
Degree-Days 382—Degree-Days to April 30, 3721

B. T. U. Basis Urged for British Radiator Ratings

The following editorial, appearing in *Domestic Engineering*, the official organ of the Institution of Heating and Ventilating Engineers of Great Britain, indicates that conditions in the British Isles are very little more satisfactory than those in the United States, as far as the rating of radiators and boilers goes:

" 'How should radiators be rated' is a question which is now being discussed in America. It is interesting to learn that there is a proposal that manufacturers should publish the ratings of their radiators in B.T.U. It was in 1922 that Mr. Herring, on behalf of the Research Committee of the Institution of Heating and Ventilating Engineers, made the announcement that it was desirable that the heating capacities should be made in B.T.U. per section, instead of the square foot rating, which he characterized as 'practically valueless.'

"In 1924, the results of the research work were published, giving the radiator emissions in B.T.U. per section per degree difference per hour and also the emission for 100° difference per hour. It was hoped then that the manufacturers would adopt fully the suggestion of the committee, but unfortunately this has not yet generally been adopted. Boilers were at one time commonly rated by square feet, until it was realized that such rating did not give the performance of the boiler for the purpose it was required. Boiler manufacturers eventually agreed to the more reasonable method of rating their products on the B.T.U. basis and we feel sure that radiator manufacturers also will come to rate their goods in a similar manner. What relation has a square foot of cast-iron to the temperature of a room; it is the amount of heat that the square foot can emit efficiently under certain conditions that matters.

WILL THE BRITISH INDUSTRY FOLLOW AMERICA IN RATING RADIATORS

"Since heating engineers adopted the B.T.U. method of calculation for their heat losses, heating installations have been more reliable, with the result that the heating profession has gained prestige. Boiler ratings have become more reliable for the same reason, so why not advance another step by rating radiators on the B.T.U. basis instead of the uncertain method of square feet of heating surface? It is six years ago since the proposal to adopt the B.T.U. basis was first made in this country and now America is introducing it. When it has generally been adopted in that country shall we then consider it worth while to introduce it here?"

American Society of Heating and Ventilating Engineers

Program for 34th Semi-Annual Meeting

PROBABLY the high light of the coming mid-summer convention will evolve about the presentation of the report of the committee on the code for the rating and selection of low-pressure boilers. At the last committee meeting, held in New York, it was decided to make a final report after a year and a half of meetings and consultations. The committee feels that a code has been prepared which is of practical value to the manufacturer and useful to the engineer, architect and heating contractor. It is anticipated that a permanent committee will be formed to administer, interpret and revise the code, as occasion requires. Another important activity will be the presentation, by E. K. Campbell, of the code for the heating and ventilating of garages. This committee's recommendations were submitted to the National Fire Protection Association at its recent convention, and adopted by that organization as a tentative standard. If the code is accepted by the society, such action undoubtedly will cause the N.F.P.A. to make it a permanent code. A number of important technical papers are scheduled. The program is as follows:

TUESDAY, JUNE 26

9:00 A.M. Registration.
Committee meetings: nominating, research, technical advisory committees.
12:15 P.M. Luncheon for officers and authors.
2:00 P.M. Greeting by President A. C. Willard.
Development of Gas Heating for Homes, by W. E. Stark.
Methods of Calculating Cost of Gas Heating, by A. E. Stacey, Jr.
Operating Data on Federal Buildings, by Nelson S. Thompson.
7:30 P.M. Council meeting.
8:00 P.M. Informal reception and dance.

WEDNESDAY, JUNE 27

9:30 A.M. Warm-Air Heating System for Industrial Buildings, by J. C. Miles.
Relative Consumption of Various Solid Fuels in Residence Heating, by V. S. Day.
Domestic Oil-Burner Design and Performance, by W. C. McTarnahan.
Heat Transfer through a Roof under Summer Conditions, by F. C. Houghton and C. G. F. Zobel.
Heat Transmission Research, by F. B. Rowley, F. M. Morris and A. B. Algren.
2:30 P.M. Golf tournament (Research Cup).
2:30 P.M. Ladies' bridge and tea.
8:00 P.M. Moving picture film (White Sulphur and New York meetings).

THURSDAY, JUNE 28

9:30 A.M. Discussion of Code of Boiler Rating and Selection.
Discussion of Code for Heating and Ventilating Garages.
A Study of Dust Determinators, by F. B. Rowley.
Methods of Air Distribution, by L. L. Lewis.
Thermal Exchanges Between the Human Body and Its Atmospheric Environment, by F. C. Houghten.
2:30 P.M. Golf tournament—ladies and men.
2:30 P.M. Trip to Marengo Cave for ladies.
7:00 P.M. Semi-annual banquet and dance.

FRIDAY, JUNE 29

9:30 A.M. Infiltration through Steel Windows, by J. E. Emswiler and W. C. Randall.
Air Leakage Through a Pivoted Window, by F. C. Houghten and M. E. O'Connell.
Effect of Storm Windows and Frame Calking on Infiltration Through and Around Windows, by W. N. Richtman and C. Braetz.
Heating and Ventilating Problems of Gas Cell Manufacture for Airships, by D. E. Humphrey.

Annual Meeting of New York Chapter

Officers of the New York Chapter, elected at the annual meeting, April 9, are: President, H. Berkeley Hedges; vice-president, E. J. Ritchie; secretary, Edward B. Johnson; treasurer, F. E. W. Beebe; directors, R. A. Wolff, Alfred J. Offner and Dr. Charles W. Brabbée.

Secretary Johnson reported the membership at the close of the year to be 239, while the average attendance during the season was 80. Treasurer F. E. W. Beebe reported a balance in the chapter's treasury of $1003.

Thornton Lewis, a past-president of the Unit Heater Manufacturers' Association and president of the York Heating and Ventilating Corp., Philadelphia, was the principal speaker of the evening, his subject being "Unit Heaters." Mr. Lewis used lantern slides very effectively to demonstrate the flow of air and its distribution with floor-mounted and with ceiling-suspended types of heaters. Mr. Lewis recommended the floor-mounted type on the ground of better distribution, less stratification and less temperature variation between the floor and the breathing-line.

One of the interesting points mentioned by Mr. Lewis was that, with a heater suspended 10 ft. to 15 ft. above the floor-line, the suction of air towards the heater is not from all directions, as might be supposed, but is along a horizontal plane on each side. This, he said, was due to the stratification of the air according to its temperature.

Association for Correlating Thermal Research

The committee organized last summer at the White Sulphur Springs meeting, to study and co-ordinate research in which the society is interested, has so expanded in personnel and progressed in its activities, that it has required a standing more definite than that of a committee. The title, "Association for Correlating Thermal Research," has been selected as best expressing the work to be done.

Technical Advisory Committee Appointed

A technical advisory committee has been appointed for developing new pipe-size tables for water heating, under the direction of Professor Giesecke of Texas, as chairman.

President Willard Addresses Engineers at University of Kentucky

Five hundred engineering students at the University of Kentucky gathered in Dicker Hall, May 9, to hear an address by President A. C. Willard, head of the school of mechanical engineering at the University of Illinois.

Professor Willard emphasized the importance of proper approaches to a real understanding of the science of heating and ventilation. After covering in a very comprehensive way the essentials necessary to carry on a creditable career in heating and ventilating, Professor Willard cited as an example, the early training of Clifford Milburn Holland. He detailed Mr. Holland's early schooling, laid stress on his adequate technical training, showed his determination to secure a comprehensive practical experience, and then lauded the qualities of imagination and thoroughness that made it possible for this eminent scientific scholar to carry to a conclusion so many worthy and epoch-making engineering projects, culminating in the Hudson Tunnel.

President Willard gave to his audience a very dramatic and picturesque description of the work that was done in research leading to the building of the Hudson Tunnel, specified the important details in reference to the design based on the research, and finally showed how this exemplified in every way what should be the rational processes of all effective engineers.

Faculty and students of the University of Kentucky gave Professor Willard an enthusiastic reception, and Vice-President Thornton Lewis came to Lexington especially to greet Professor Willard on the occasion of this visit.

At the conclusion of Professor Willard's address, speeches were made by President Frank L. McVey of the University of Kentucky, Thornton Lewis, J. A. Carey, of Philadelphia, and William G. Boales, of Detroit.

Western New York Chapter

The principal speaker at the May meeting, held at the Hotel Buffalo, Buffalo, N. Y., May 14, was L. A. Harding, past president of the Western New York Chapter and vice-president of the National association. His subject was "Experimental Demonstrations of the Fundamental Laws Governing the Use of Air in the Heating and Ventilating Industry."

Minnesota Chapter

Annual field day was held at the Thorp Country Club, Minneapolis, May 23, with golf in the afternoon, dinner, annual meeting and cards in the evening. Nominations for officers for 1928-9 are: President, A. J. Huch; vice-president, Edward Jones; secretary and treasurer, D. M. Forfar; board of governors, Albert Buenger and M. S. Wunderlich.

President Willard Pays a Fine Tribute to Dean Anderson

Returning from Lexington, Kentucky, where he addressed the entire engineering school of the University of Kentucky, Prof. A. C. Willard, head of the school of mechanical engineering at the University of Illinois, spoke enthusiastically of his experiences:

"I have just visited the engineering college of the University of Kentucky and its famous dean, F. Paul Anderson. The experience has been illuminating, showing engineering education and research in a setting of good fellowship and hospitality which undoubtedly is unique in this country. The technical features of the picture are not lacking, and the spirit of hard work and earnest purpose are everywhere apparent. But back of it all and showing through the more formal objects in the picture is a background of broad sympathy and human understanding, all of which is inspired and fostered by the dean himself.

"He believes men succeed or fail as a result of certain intellectual and human qualities which each man possesses in varying proportions, and that the human side of his graduates is just as important for future engineering success as the intellectual side. He practices what he preaches, and his graduates justify his text. Kentucky men are not only successful engineers, as those of us in the field of heating and ventilation, in which many of them have made distinctive records, well know, but they are pleasant gentlemen as well. They have a fine sense of the amenities which make life worth living, and if you visit Lexington you will find out why. You may wonder, as I did, how the dean does it, but you at least will appreciate the reality of the human atmosphere this man believes in and has created among his staff and students.

"But atmosphere alone never can produce the heating and ventilating engineers which the dean so successfully has trained. This has required a loyal and capable staff and technical equipment adapted to the problem in hand, whether student instruction or scientific research, as, for example, Professor O'Bannon's investigation of heating boilers and their performance characteristics.

"Nowhere in the country to-day is there a better-equipped heating-boiler testing laboratory than at the University of Kentucky. The manufacturers and users of such equipment, as well as the heating and ventilating engineers of this country, are interested in this fact. There are not many independent and unbiased institutions which are qualified to make complete boiler tests covering all the factors affecting boiler performance. This new laboratory is a "going" institution. It should be kept "going" constantly, either by the heating-boiler industry, to which it can render an invaluable service, or by the support and interest of our own society through its research laboratory.

"Our mutual interests as heating engineers depend upon the extension and checking up of our technical data by such scientific institutions as the boiler testing laboratory at the University of Kentucky. Dean Anderson s humanizing presence will make the relationship a pleasant experience in good fellowship and Kentucky hospitality."

Heating and Piping Contractors National Association

Annual Meeting of Wisconsin Association

Heating and Piping Contractors Wisconsin Association held its annual convention at the Elks Club, Milwaukee, April 17-18, and, in addition to members, a large number of non-member contractors were present as guests, the total registration being 100.

The subject of the meeting was "Certified Heating," and complete details of the plan were explained and its successful operation in both large and small cities was pointed out. C. P. Fink, one of the five members comprising the Heating and Piping Contractors Sheboygan Association, pronounced the adoption of Certified Heating by his association as a success from the start.

Edward G. Byrd, field representative of the National association, gave a further talk on the subject, and stated the necessity for a larger and stronger state association in order successfully to combat the evils in the industry.

Individual members of the Wisconsin association expressed themselves as in favor of the adoption of Certified Heating, and plans were made to put it in immediate operation.

The following officers were elected for the ensuing year: President, J. Zimmerman, Kenosha; vice-president, Paul Downey, Milwaukee; secretary-treasurer, A. F. Bowers, Milwaukee; sergeant-at-arms, Michael Mueller, Milwaukee. Directors are: George Riecke, Green Bay; J. J. Wiertz, Racine; T. L. Ahern, Fond du Lac; C. A. Honold, Sheboygan and Louis Erons, Wisconsin Rapids.

The annual banquet and entertainment followed the business meetings. This was the largest convention ever held by the Wisconsin association.

Washington Association Elects Officers

Heating and Piping Contractors Association of Washington, D. C., held an election of officers at a recent meeting selecting as president, E. F. Febrey; vice-president, M. J. Colbert, and secretary-treasurer, William H. Gottlieb.

At this meeting a Certified Heating program was planned and will be put into effect when an executive secretary has been engaged.

Ventilation News, published from time to time by the American Blower Corp., Detroit, Mich., has in its latest issue a number of photographs showing the varied applications of different types of fans and ventilators manufactured by this company. These cover almost every conceivable activity including the test rooms in an automobile factory, a chemical laboratory, a paint-spray booth, a textile mill, a dairy building, a mine and a food manufacturing plant.

The Adsco Advocate, published by the American District Steam Company, North Tonawanda, N. Y., features in its recent issue the "standby" electric plant used for district heating in Winnipeg, showing the economies effected by the combination of the two utilities. There is also an interesting and instructive article on the design, construction and application of expansion joints.

National District Heating Association

Program of 19th Annual Convention

THE nineteenth annual convention of the N.D.H.A. will be held at the Ambassador Hotel, Atlantic City, N. J., June 12-15. The program will be as follows:

TUESDAY, JUNE 12

A Utility Welcome, C. H. Howell, Atlantic City Electric Co., Atlantic City, N. J.
Allocution of the president, Charles A. Gillham, New York Steam Corp., New York.
Financial report and suggestions for the coming year, D. L. Gaskill, executive secretary, Greenville, O.
Report of Educational Committee covering action on handbook, J. H. Walker, Detroit Edison Co., Detroit, Mich.
Report of Heat Utilization Committee, L. S. Smith, chairman, Rochester Gas & Electric Corp., Rochester, N. Y.
Report of Executive Committee.
Manufacturers' Round Table.
Appointment of committees.

TUESDAY EVENING, JUNE 12

Report of Research Committee, F. B. Orr, chairman, Illinois Maintenance Co., Chicago, Ill.
Manufacturers Division and its work, A. J. Slade, American District Steam Co., North Tonawanda, N. Y.
Work of the Development Committee, John W. Meyer, chairman, Philadelphia Electric Co., Philadelphia, Pa.
Illustrated lecture on district heating progress.

WEDNESDAY, JUNE 13

Report of the Operating Statistics Committee, J. C. Butler, chairman, Illinois Maintenance Co., Chicago, Ill.
"The Recent Course of Study at Purdue University," Prof. C. H. B. Hotchkiss, Purdue University, Lafayette, Ind.
"Putting a Hot-Water System in Black Ink," Stephen Delaney, Atlantic City Electric Co., Atlantic City, N. J.
"Hot Water as We Handle It in Terre Haute," Henry Meyer, Citizens Mutual Heating Co., Terre Haute, Ind.
Manufacturers' Round Table.

THURSDAY, JUNE 14

Report of Meters and Accessories Committee, J. Schenk, chairman, Rochester Gas & Electric Corp., Rochester, N. Y.
Report of Rates and Regulations Committee, John W. Meyer, chairman, Philadelphia Electric Co., Philadelphia.
"Interesting Differences Between Steam Heating in Canada and the United States," A. H. O'Reilly, Winnipeg Steam Heating Co., Winnipeg, Canada.
Manufacturers' Round Table.

FRIDAY, JUNE 15

Election of officers.
Report of Station Operating Committee, E. E. Dubry, chairman, Detroit Edison Company, Detroit, Mich.
Report of Distribution Committee, W. W. Stevenson, chairman, Allegheny County Steam Heating Co., Pittsburgh
Adjournment.

District-Heating Recommended for Business Section

Recommendation has been made by Edward W. Forrest, secretary of the Forty-second Street Property Owners and Merchants' Association of New York City, that individual heating plants, in the older buildings of the midtown section be eliminated in favor of central heating service supplied now by two companies to minimize the smoke nuisance from these buildings.

National Warm-Air Heating Association

15th Annual Convention of National Warm-Air Heating Association

With 400 delegates in attendance, the fifteenth annual convention of the National Warm-Air Heating and Ventilating Association, was opened at the Stevens Hotel, Chicago, April 24, and adjourned April 26, as the National Warm-Air Heating Association, into which had been merged the Western Warm-Air Furnace and Supply Association and the Midland Club. A constitution and by-laws, revised to take cognizance of the new régime, was adopted during the convention.

Oliver J. Prentice, C. A. Dunham Co., Chicago, delivered the address of welcome for the Chicago Association of Commerce. The principal speakers were F. J. Nichols, merchandising counsellor, Dayton, O., who discussed merchandising and markets; Prof. J. D. Hoffman, Purdue University, a member of the Joint Code Committee, who told of the minor amendments that had been made to the fourth edition of the code, which is now in fifth revision—only minor changes have been made, the fundamentals having been well established; R. M. Conner, director, American Gas Association Testing Laboratory, Cleveland, who read a paper on "Testing Central Heating Plants Using Gas as Fuel," and John H. McIlvaine, president, McIlvaine Burner Corp., Evanston, Ill., who discussed oil-fired warm-air furnaces. Professors A. C. Willard, A. T. Kratz and V. S. Day, of the University of Illinois, discussed various factors of the rating formula and disclosed the latest results of the research program, following which there was an extended discussion on this pertinent topic.

Officers and directors for the ensuing year were elected as follows:

President, Charles E. Hall, Indianapolis, Ind.; First vice-president, Charles Seelbach, Cleveland, O.; Second vice-president, H. T. Richardson, New York; Treasurer, W. P. Cooke, Monroe, Mich.; Secretary and managing director, Allen W. Williams, Columbus, O.

Directors: E. B. Langenberg, chairman, St. Louis, Mo.; C. E. Olsen, Elyria, O.; A. H. Landwehr, Holland, Mich., and T. E. Henry, Cleveland, O.

The semi-annual meeting will be held at Buffalo next December, and the next annual meeting at Indianapolis, Ind., in April, 1929.

Better Business Committee for Warm-Air Heating Industry

To enable members, particularly those engaged in warm-air furnace sales and installation, actively to participate in stimulating business by solving many of the problems constantly facing the industry, the National Warm-Air Heating Association has established a better business committee, with E. C. Taylor as chairman. Associate members and the rank-and-file, who carry out the actual installation work, are urged to pass on to Mr. Taylor any suggestions for corrective measures, or of better methods of attaining high-class results.

Chicago Warm-Air Ordinance Code

An amendment to the Chicago warm-air Ordinance Code, made April 18, 1928, and effective May 18, provides that all persons engaged in the business of installing, altering, or repairing gravity warm-air heating plants within the City of Chicago, before engaging in such work, shall apply for registration to the Commissioner of Buildings, who shall collect a registration fee of $50 and cause such persons to file a bond for $10,000 with the City Collector of the City of Chicago.

For every installation, alteration or repair, each such contractor or other person engaged in such business also shall obtain a permit and a permit fee of $5 will be charged.

Legal Decisions

Electrical Air-Heating Rates

The Washington Department of Public Works rejected an increase of air heating rates by an electric utility, the Washington Water Power Company, and ordered a more moderate increase, as it appeared that although the company had been supplying energy for air-heating at non-compensatory and discriminatory rates for several years, many of its patrons had been solicited for air-heating service at these rates, and would be forced to abandon their air-heating equipment if the proposed rates were charged, and it was desirable that the losses be distributed equitably between the company and the customers.

Covenant to Heat Leased Premises—Tenant's Duty

In an action by the tenant of premises used as a restaurant for damages for an alleged breach of covenant to supply heat in accordance with the provisions of the lease, it appeared that nothing had been said before the lease was signed as to the number of hours per day the restaurant would be kept open for business. The lease contained the following clause: "The lessors agree reasonably to heat the said premises during the cold season of the year, except when interfered with by the heating apparatus becoming out of order or repair, or by conditions beyond the control of the lessors." The plaintiff and his partner conducted a restaurant business on the premises for over a year, when the plaintiff purchased his partner's interest, and occupied the premises as a restaurant for about nine months. During the partnership and afterwards the lessors supplied heat when necessary from 7:00 A.M. until 8:30 P.M. During all that time the restaurant was opened regularly at 4:30 A.M. and closed at midnight. During the last three months of his occupancy the plaintiff complained at different times of not having heat early in the morning and late at night as he claimed to be entitled to under the lease. The lessors gave him permission to operate the furnace, and offered him a key to the cellar. This he refused, on the ground that he was not familiar with the operation of an oil-burning heater, and did not care to trouble himself in the matter. He requested the lessors to install a gas-heater in the restaurant. The lessors offered to pay for the cost of installing such a heater and to credit the tenant with the cost of gas consumed in producing extra heat. The tenant refused to have the gas heater installed, because the lessors told him not to run the gas pipe a long distance through another part of the building to the lessors' gas meter, but to connect with his own gas line which was nearer at hand, and charge them with the expense. The tenant contended that his business was ruined because of lack of heat, and sought to hold the lessors in damages for the value of his business. Judgment was given for the plaintiff in the trial court for $2,366.67, and the defendants excepted.

As to the tenant's duty under the circumstances, the Rhode Island Supreme Court said, Feiler v. Z. Zawatsky & Sons, 138, Atl. 177: "He had the privilege of having as much heat as he desired by installing a heater without expense to himself, or by regulating the furnace in the cellar at a slight inconvenience or cost. He refused both. The jury found specially that he refused to regulate the furnace. Under such circumstances he was not justified in permitting his business to be ruined, if in fact it was, and looking to the defendants for compensation for his loss. The jury evidently found that he had a profitable business which was lost for the want of heat, but his conduct raises a strong suspicion that his complaints relative to heat were for the purpose of laying a foundation for avoiding a lease which was useless to him because he was unable, regardless of the question of heat, to do business there at a profit. However, assuming that the plaintiff did suffer loss by reason of the lack of heat, which the defendants covenanted to supply, it was his duty to adopt reasonable measures to minimize his loss. This, we think, he has failed to do. A tenant is, of course, required to do no more than is reasonable. In many instances the building is so constructed, or the licensed premises are so situated, that no reasonable efforts on the part of the tenant would supply him with heat. On the evidence presented the jury were not warranted in finding the plaintiff, by reasonable effort, could not have secured as much heat as his business required. The plaintiff has suggested nothing to excuse his conduct, except inconvenience, which would have been slight compared with a loss of business as great as he contends. Even the expense could have been charged to the landlords, and they offered to pay the expenses of heating by a method suggested by the plaintiff. 3 Sedgwick on Damages, sec. 995 states the rule in such cases as follows: 'For breach of a covenant to heat the leased premises the measure of damages is the difference in value of the premises heated as stipulated in the lease, and the value as they were in fact heated; not, however, exceeding the reasonable cost of supplying the heat. Such an agreement is subject to the rule of avoidable consequences, and the lessee can recover no consequential damages if he might have heated the premises himself.'"

In the circumstances, the question of whether the tenant's conduct was reasonable was held one of law for the court and not one of fact for the jury.

Since the tenant did not accept the lessors' offer to put heating plants at his disposal, evidence as to his profit and loss or the value of the business lost was held inadmissible.

As the lease did not definitely state what the agreement was as to the hours during which heat would be furnished, and the plaintiff, though producing no proof to show his damage under the rule above stated, did submit testimony tending to show he was damaged by the lessors' breach of covenant, it was held that the case should be submitted to another jury, and a new trial was ordered.

Lien for Installation of Heating Plant Contracted for by Tenant

A contractor filed a mechanic's lien under the Illinois statute for the installation of a steam heating plant, etc., in certain buildings, the work and materials having been furnished at the request of a tenant in possession of the property. The owners denied any knowledge of a contract between the tenant and the contractor for the installation. The master to whom the case was referred reported that, with the knowledge of the owners of the property, the contractor had furnished labor, materials, etc., in the installation of the heating plant, etc., to a certain amount; that the tenant had made certain payments, and a credit should be allowed for materials removed from the premises; and that the contractor was entitled to a mechanic's lien for the balance.

There was a clear preponderance of evidence to the effect that two of the owners of the property were both in and about the building when the heating plant was being installed therein, and that the finding was warranted that the third owner, who resided within 200 yards of the premises, had constructive if not actual notice.

It was therefore held, Young v. Bergner, 243 Ill. App. 473, that, the owners of the premises having knowledge of the improvements being made thereon, a mechanic's lien would lie therefor, if the improvement were of a character for which a lien is given by the statute. That it was of such a character was not denied. The only argument against the lien was that the heating plant and other work were not necessary, and did not increase the value of the premises. It was held that, the owners of the premises having been advised of the character of the heating plant and plumbing work being installed in the premises, and not having objected thereto, they were not in a position to defend against a mechanic's lien therefor on the ground that the work was not necessary.

Glancing Backward

High Lights in the Evolution of Leaders in the Heating and Ventilating Industry

VI—United States Radiator Corporation

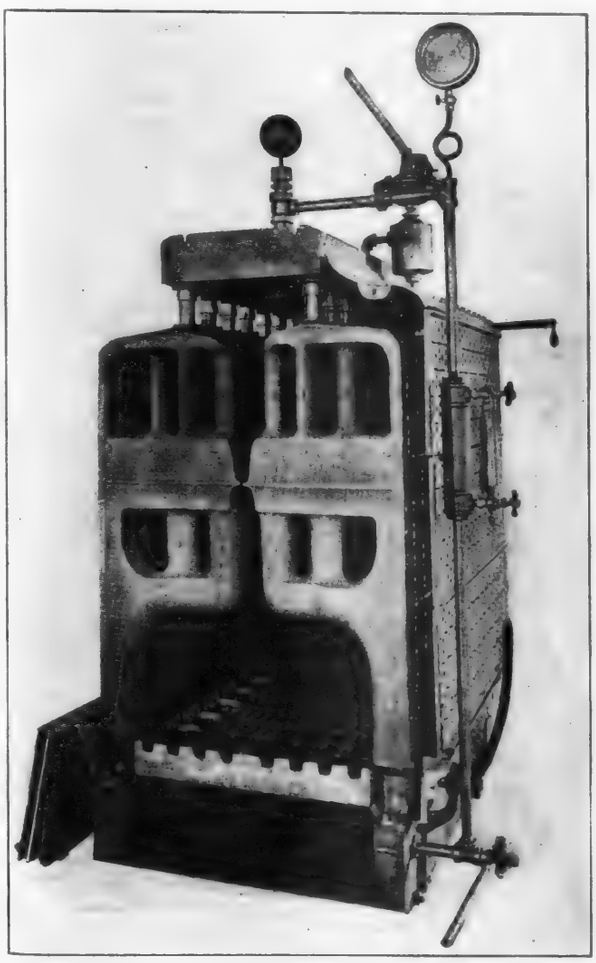
THE story of the United States Radiator Corporation had its beginning in the pioneer days of steam and hot-water heating, and includes the period of development in this field since 1883. The combined experience of the elements of this corporation, in the problems of heating and business, covers a full generation.

The organization of the United States Radiator Corporation was consummated in July, 1910, by the purchase of the following concerns: United States Radiator Co., Dunkirk, N. Y., manufacturer of Capitol boilers and Puritan and Florentine radiation; the United States Radiator and Boiler Co., Pittsburgh, Pa., manufacturer of Sun boilers and Sun radiation, with plants at Corry and West Newton, Pa.; the Herendeen Manufacturing Co., Geneva, N. Y., manufacturer of Furman boilers; the heating department of the J. L. Mott Iron Works, distributor of Sunray boilers and Grecian radiation. The corporation later acquired the Sodemann Radiator Co., St. Louis, with factory at Edwardsville, Ill.; the Central Radiator Co., Paola, Kan., and Smith & Thayer Co., Boston and New York, distributor of Winchester boilers.

BACK IN '83

The oldest of these companies, the Herendeen Manufacturing Company, was organized in 1888, by E. W. Herendeen. Previous to that time, from 1883 to 1887, several boilers had been made in Geneva, by F. J. Furman, but it was in 1887 that Mr. Herendeen, who was engaged in the manufacture of harrows, became interested in Mr. Furman's boiler; the next year he formed a stock company for the manufacture of these boilers on a large scale. During the first year of manufacture, only two sizes of one type of boiler were made, but in later years other series were brought out in several sizes. At one time radiation was manufactured, but this soon was discontinued. Mr. Furman still is an active employee of the United States Radiator Corporation, as are two other employees who started in the boiler business with Mr. Herendeen.

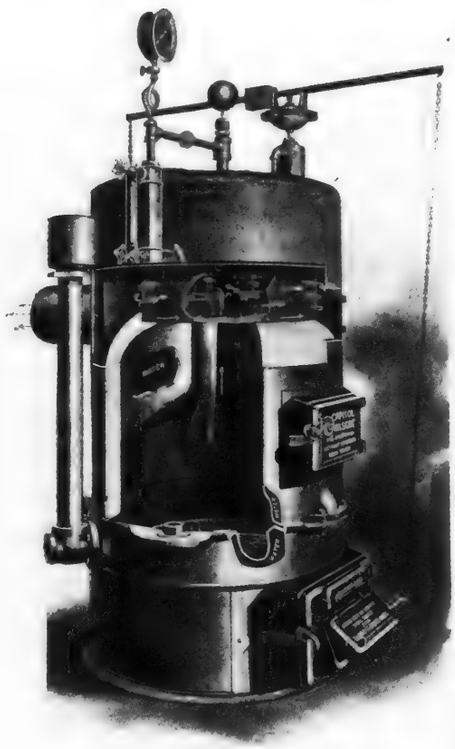
The United States Radiator Company also had its beginning in the invention of a boiler. Richard Harrel and his son William H. Harrel, employees of the Brooks Locomotive Works, of Dunkirk, manufactured in a very small and crude way a house-heating boiler, that attracted the attention of the United States Government. Quite a number were installed in government buildings and the boiler gained a fairly wide and favorable reputation. In 1889, local capitalists in Dunkirk became interested, and the Harrel Steam Heating Company was incorporated. Operations were not actually started until 1890, and after various difficulties it was decided to abandon the manufacture of boilers and confine the business exclusively to the manufacture of radiators. The Harrels retired from the business about 1892, and the name of the company was changed to the United States Radiator Company, which put out several lines of radiators, the last being the Triton; it was with this full line of Triton radiators that the United States Radiator Company entered into the corporation in 1910.



Capitol Steam Heater of the Vintage of '94, Showing Water-Backed Ash-Pit Base Into Which Returns Discharge, and Cast Header to Which Each Section Is Connected With Nipple and Lock Nut

ORIGIN OF UNITED STATES RADIATOR COMPANY

The United States Heater Company was organized in 1892, by George A. Ducharme, John Rathbone and Henry T. Cole, for the manufacture of boilers. It succeeded the Capitol Heater Company that had been established a year or so before but had not been successful in marketing its product. The Capitol boiler, put out by the United States Heater Company, was one that two men in the heating industry, Henderson and Smith, had worked on and for which they had obtained patents. It constituted a new type, distinctly in advance of previous cast-iron heaters and the soundness of these men's ideas is attested by the present standing of Capitol boilers after a test of over thirty years. The United States Heater Company had no foundry of its own until 1895. Up to that time, its castings were made by a foundry in Canton, O., and shipped to Detroit, where they were machined and assembled into completed



An Early Round-Type Boiler Built Up From Four Annular Sections

boilers. In 1900 this company commenced the manufacture of radiators, bringing in a man from a radiator foundry in Ohio to superintend that part of the work. At the time of the consolidation with the corporation, Capitol boilers and Florentine and Puritan radiators were manufactured by the United States Heater Company.

At this point it is interesting to note that the first boilers put out by Furman and the Harrels were steam boilers, while Henderson and Smith's were hot-water boilers. The Herendeen Manufacturing Company and the United States Heater Company, however, soon began manufacturing both steam and hot-water boilers.

The fourth company of the group of larger ones, the United States Radiator and Boiler Co., Pittsburgh, operated at one time under the name of the United States Radiator Company. It was first organized in 1889, but had no foundry of its own until 1892, when the capital was increased and a plant established at Saltsburg, Pa., for the manufacture of radiators.

OLD-TIME RADIATOR CONSTRUCTION

Here the "Ornate" radiator was made. At this time radiators were made and put together in various ways, some with right-hand screw nipples with the washer at the top for top connections, some with right-and-left-hand screw nipples, and some with washers both at the top and bottom. Owing to the cost of tapping machines and to the lack of capital to buy them, the "Ornate" radiator was made with the nipples cast in the section with a chilled face in order to make it smooth. A thin washer was used to make it tight. This radiator was made that way until it was abandoned some years later. At this plant radiators were made in the old way, using what was known as the "roll-over pattern," and made on the floor.

THE BEGINNING OF BENCH-MOLDED RADIATORS

Later patterns were mounted on a plate and the flasks were lifted instead of lifting the patterns. These moulds were made on a bench, and the new process increased the day's work from 15 to 30 per man. This was the first bench job of molding radiators. Since then various devices have been made for lifting flasks, but radiators never went back on the floor, although to this day some plants are using the old fashioned rollover patterns and are making them on a floor, putting up 30 or 35 per day. This was given up when property was acquired at West Newton, Pa., and a plant established there for the manufacture of both boilers and radiators. This plant, while small, was well arranged for the manufacture of radiators, and up-to-date machinery was used. All sections were machined for push nipples which were made of boiler tube, and the taper turned. Soon after this plant started there was developed a great improvement in the making of cores. The system of booking the cores and doing away with the old-style vent rods was put into effect, more than doubling the output per man.

A year later the manufacture of boilers was started—the "Famous," "Reliance" and still later the "Sumary" and "Sun." In 1897, the management tried putting boiler patterns on plates and lifting the flask, instead of the old way of lifting the pattern, with the slow process of rolling over the flask and drawing the pattern. This was the first attempt to try out this way of molding boilers. After overcoming the numerous difficulties that arose, they made a success of the method and increased the day's work from 3 per man to 10 per man, and later, to as many as 40 for a man and helper. Since then various machines have been used to mold boiler sections, but the pattern always has remained on the plate. At that time the sections were bored, one hole at a time, on a drill press by means of a jig to assure them all being the same and, in 1900, a large boring machine was installed that bored all six holes at once.

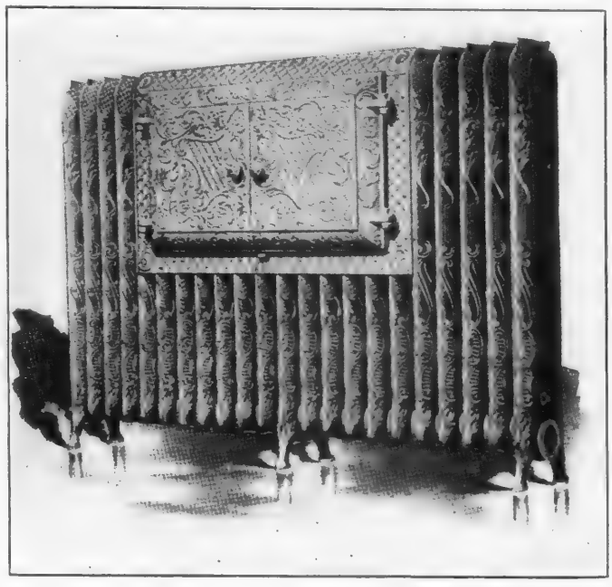
MOLDING ON CONVEYORS

Later a very elaborate plant was built, with a large mold conveyor containing 120 small cars, at one end of which the drag half of the mold was made and put on the little cars and moved along, the core being put in while moving. Further down, the cope was made, put on and clamped while moving to the cupola where it was poured; then it passed to the other end, cooling while moving. At the end it was shaken out and the section placed on a moving rack which bumped out the core sand, after which it was passed through a brushing machine and delivered into the test room. This was a fascinating process, but expensive to operate.

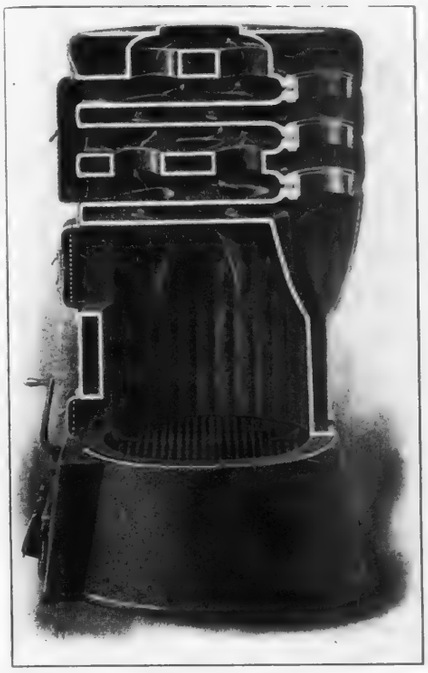
In 1904, the Corry Radiator Co., Corry, Pa., was purchased, to better serve the trade in Western New York, and the name of the company changed to the United States Radiator and Boiler Company. This organization continued until 1910, when the consolidation of the several companies was accomplished.

The most recent acquisition is the Pacific Steel Boiler Corp., of Waukegan, Ill., the corporate name being changed to Pacific Boiler Corporation.

When the United States Radiator Corporation was organized, one of the first items for consideration was standardization of the product. Many sizes and types of boilers and radiators were being manufactured and the problem was to select, from these designs, the prime features that when combined would produce the most efficient and durable product. The boiler and radiator knowledge of the entire manufacturing forces



This Ornate Dining Room Radiator With Its Cute Little Warming Oven Was the Mode About the Time of the Chicago World's Fair



Furman Round Sectional Boiler of 20 Years Ago, Remarkably Similar in Design to Round Boilers of Today

of the constituent companies was brought to bear upon the subject and, after years of actual working tests, under all conditions in all parts of the country, the present line of Capitol boilers and United States radiators, as now manufactured by the United States Radiator Corporation, has been stabilized.

Plants for the manufacture of Capitol boilers and United States radiators are located at Corry, Pa.; Dunkirk, N. Y.; Detroit, Mich.; Geneva, N. Y.; Edwardsville, Ill., and West Newton, Pa. The warehouse facilities for the distribution of this product have increased from seven warehouses, in 1910, to thirty-two at the present time. This wide distribution of manufacturing plants, together with the greatly increased warehouse facilities in the principal shipping centers, enables the corporation to ship promptly to every section of the country, with little probability of delay in transit.

The officers elected at the time of the organization of the United States Radiator Corporation were: Robert J. Gross, president; Henry T. Cole, vice-president and treasurer; W. L. Herendeen, vice-president and general manager of sales; J. J. Blackmore, secretary; C. W. Garrett, assistant treasurer; W. E. Mosher, assistant treasurer, and E. C. Reed, assistant secretary. General offices were established in Dunkirk, N. Y., but were moved, in the spring of the next year, to Detroit, where they have since remained.

At the present time, the officers are: Henry T. Cole, president; E. E. McNair, vice-president; J. F. McIntire, vice-president; W. E. Mosher, secretary and treasurer. All these men have a background of many years of experience in the boiler and radiator industry and all began their careers with one of the constituent companies, Mr. Cole with the United States Heater Company, Mr. McNair with the United States Radiator Company, Mr. McIntire with the United States Heater Company, and Mr. Mosher with the Herendeen Manufacturing Company. There are many others in the organization at the present time who have seen many years of service—eighty-three were with some one of the original companies before the consolidation, and seventy-seven of these have served continuously for fifteen years or more.

New Award by the A. G. A.

The American Gas Association announces, through its executive board, the establishment of the Charles A. Munroe Award to provide annually for the financial recognition of that individual, who, in the opinion of the board, has made the most outstanding contribution during the year in the general interests of the gas industry. Earnings of a fund of $10,000 given by Mr. Munroe, will be available for this purpose.

Contributions to the advancement of the gas industry may include the following: research, invention, operating methods or practices which reduce cost of manufacture and distribution, improved distribution or other service, increased sale of gas, development of new uses for gas, improved employee and public relations, promotion of safety, development of improved accounting practices, widening of the field of gas-making materials, new methods of manufacture, finance, publicity, new gas works products and by-products and rates.

HINTS FOR GREATER COMFORT IN YOUR NEW HOME is the title of a publication issued by the American Gas Association, New York, in its campaign for extended utilization of gas. This book is designed to inform the home builder or owner of the many new services which gas performs today in the household, and at the same time gives complete information on the appliances especially recommended for the home. It is intended to be presented personally to the home builder, by a representative of the local gas company wherever possible, and has been made in loose-leaf form so that only those appliances need be incorporated which are suitable for the home in question. Space is provided on the pages referring to the range, water heater, fireplace heater, incinerator, refrigerator and other equipments, so that gas companies can "tip in" the manufacturer's folders describing the particular appliance recommended.

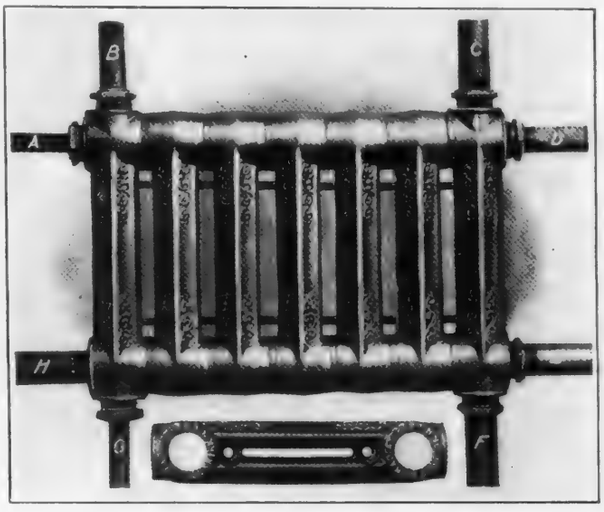
The entire make-up of this publication is attractive, and in placing it in the hands of a prospective home builder, the gas company distinctly is rendering a service. The section, "Details of Importance to Home Builders," has paragraphs headed "The Needs of your Family"; "The Necessity for Carefully Designed and Complete Plans"; "Necessity for Explicit Contracts, Duly Signed and Drawn to Conform to Lien Laws"; "Necessity for Supervising Building Operations"; "Financial Arrangements." There are pages relating to cooking with gas, to heating domestic water, to radiant heaters and to complete gas heating, as well as to minor conveniences, such as laundry dryers and incineration equipment.

William J. Serrill to Direct Industrial Standardization Movement

William J. Serrill, assistant general manager of the United Gas Improvement Company, of Philadelphia, has been elected chairman of the American Engineering Standards Committee, to succeed C. E. Skinner, of the Westinghouse Electric & Manufacturing Company, who has held the office for the past three years.

Mr. Serrill has been prominent in standardization activities in the gas industry, serving for many years as representative of the American Gas Association.

Cloyd M. Chapman, engineering specialist, New York City, will be vice-chairman of the committee.



Early Wall Radiators Were Tapped for Connection from Any Direction at Any Corner

Oil Burners for Large Low-Pressure Heating Plants

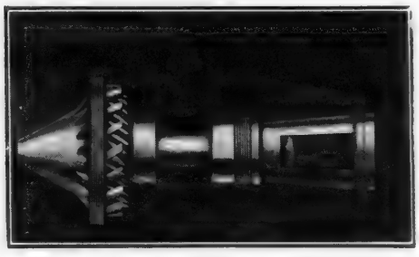
Winslow Turbine Burner. *Rotating-Cup Atomizing, Manual Ignition*

7. Winslow

Previous articles in this series are:
1. *Todd*, August, 1927.
2. *W. N. Best*, September, 1927.
3. *Ballard*, October, 1927.
4. *Ray*, November, 1927.
5. *Johnson*, December, 1927.
6. *Petro*, January, 1928.

THE Winslow industrial oil burner is designed and built by the Winslow Boiler & Engineering Co., Chicago, under the patents of the Turbine Fuel Oil Company, a western organization with an extensive background in the industrial heating field. The earliest burners of this design have been in use for over a quarter of a century and this fact naturally is reflected in the design of the present-day Winslow burner.

The practice of this company contemplates the use of a single blower—with of course a reserve unit where desired—supplying low-pressure air to any number of burners. The blower unit consists



Detail of Winslow Air Turbine and Atomizing Cup

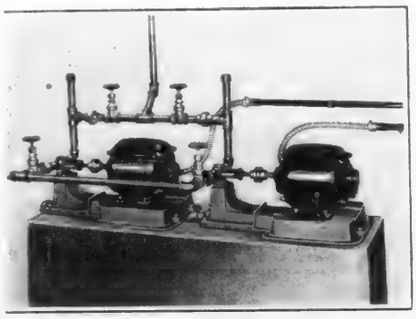
of a standard make of motor, direct driving a centrifugal fan of special design.

The use of a steel band following the circumference of the fan blade has been largely responsible in decreasing, to a large degree, the noise of the air movement through the fan.

Further to reduce to a minimum the noise of the motor-blower unit, a soundproof box has been designed which is placed completely around the unit. It is lined with loosely-draped silk in such a way that air is permitted a free movement to the fan intake but the inherent noise of the motor is muffled almost entirely. Blower and pump units are mounted on cork bases. A duct of proper size conveys air to the burner proper.

THE TURBINE

The burner element consists of an elbow shaped tube, the horizontal portion of which constitutes the nozzle which is inserted through a special plate taking the place of the fire-door. In the extreme end of this nozzle is mounted a cup-and-turbine unit rotating on ball bearings. The inner end of this element is streamlined into a set of vanes and a blast of air generated by the blower, acting against these vanes, causes the shaft to rotate at a speed of 10,000 R.P.M. or more. Fuel oil is fed into an annular space around the shaft of the runner and flows through comparatively



Duplex Installation of Oil Pumps

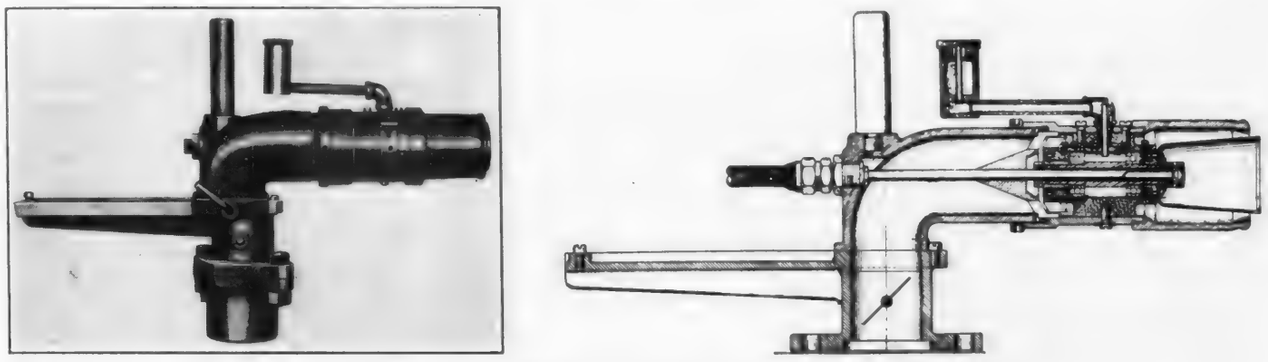
large openings to the interior of the cup, which is conical in shape with the large end machined to a sharp edge and projecting slightly from the end of the nozzle. The oil is thrown from the periphery of the revolving cup in finely atomized form, heat from the flame aiding in changing the viscosity of the oil as it moves the length of the cup. The portion of the burner carrying the revolving turbine cup is easily removed without the use of tools so that a spare assembly can quickly be inserted. Due to the high velocity with which the cup revolves, it is possible to start with cold oil and thus eliminate the use of electric or other heaters.

Winslow Blower Unit

FLEXIBILITY

The burners thus consist essentially of the blower and of the rotating cup element, together with means for metering the oil and for controlling the air flow. Accessibility is a feature of this burner, the assembly of the "gun" being such that inspection or repair readily can be carried out.

Boiler Room Equipped With Three Oil-Fired Boilers Using Winslow Turbine Burners



(Left) Assembly and (Right) Cross Section of Winslow Turbine Burner

Where standby units are installed any one of the blowers will be of sufficient capacity to provide air for the entire burner equipment. Oil is supplied to the burner by separate motor driven oil pumps, this installation usually being furnished in duplicate. As a matter of fact, duplicate burners usually are installed in larger sizes of boilers because of the slight additional cost and the marked increase in flexibility. Two burners also may be used in boilers with wide fire-boxes, and in this case the bridge wall is brought considerably forward and a short, wide combustion chamber results. This permits higher temperatures in the front of the boiler and frequently results in a material increase in efficiency. Another result of this short fire-box and of the dual burner installation is the reduction of excess air passing through the fire. A further advantage is in the range of capacity which in such case may be as great as ten to one.

Blower and pump units are mounted on cork bases and oil piping to pump is made through flexible metallic connections. Winslow burners can be arranged with high-low flame control for semi-automatic regulation. On low-pressure steam boilers a standard sylphon is used to operate a lever valve controlling the flow of oil to the burner. On water boilers a hot-water sylphon is used and on warm-air furnaces an airstat. By this means of regulation the flow of oil is controlled by the heating medium.

The primary characteristic of this equipment is simplicity and ruggedness. The Winslow industrial burner is listed by the Underwriters to burn oil not heavier than 12° A.P.I.

"Absolutely Safe"?

Every month advertising copy submitted to THE HEATING AND VENTILATING MAGAZINE either is declined or is rephrased because of objectionable statements that violate the simple code set up by the magazine. One obnoxious term used particularly in regard to oil burners is "absolutely safe." Writers of advertising copy and of booklets seem unable to resist the temptation to insert this misleading clause or its equivalent. It was thought worth while to get an expression of opinion on this question from the Underwriters' Laboratories and to this query, which hardly need be quoted, the following letter was received:

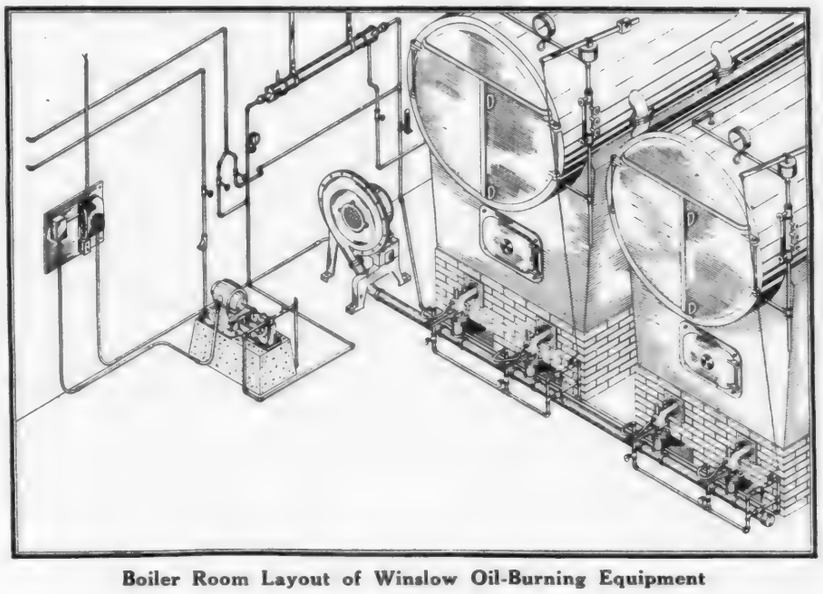
"I am fully in accord with your views with regard to the use of the terms 'absolute safety' or 'absolutely safe,' as expressed in your letter of March 27. The term 'absolutely safe' is one which has been so much abused that it appears to me only the young or inexperienced advertising man would care to use it.

"Technically and practically speaking, no device producing flame or high temperature may be classed as absolutely safe, irrespective of whether the fuel used is solid, liquid, or gaseous. Our general statement with regard to such devices which are included in our Lists is that they have been safeguarded so far as practicable."

Yours very truly,
E. J. SMITH,
Engineer, Gases and Oils.

New Officers of the Boston Oil Burner Association

At the last annual meeting of the Boston Oil Burner Association, the following officers were elected: President, Arthur W. Clark, New England manager of the Wayne Company; vice-president, James J. Kelly, vice-president of the Ballard Oil Burning Equipment Company; secretary-treasurer, Max Seitzer, sales manager of the Super Automatic Oil Burner Company. Plans for increasing the membership were made at this meeting as it was decided that the oil-burner industry warranted a larger association in greater Boston.

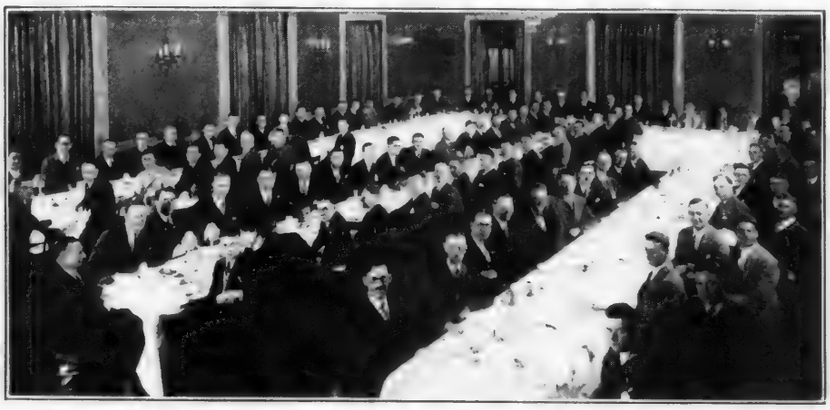


Boiler Room Layout of Winslow Oil-Burning Equipment

Oil-O-Matic Convention

The fourth international Oil-O-Matic convention will be held at Bloomington, Ill., June 25-26, in which it is expected that 3000 delegates will take part. It is understood that Model J Oil-O-Matic, Ice-O-Matic and the new Dist-O-Matic will be in production at that time. The first hotel reservation for the convention was cabled from Australia by A. W. Plaisted, the Australian distributor.

The Home of To-day is an interesting little house organ initiated by the Williams Oil-O-Matic Heating Corp., Bloomington, Ill., and designed for circulation among its customers. The initial issue is attractive and contains many little items of value to the home owner. A digest of the contents of national magazines for women is interspersed with suggestions pointing to the Oil-O-Matic burner as a worth-while adjunct to the modern home.



Banquet of Petro Distributors and Dealers, Commodore Hotel, New York

Petro Sales Convention

At a sales convention recently held at the Commodore Hotel, by the Petroleum Heat and Power Co., 511 Fifth Ave., New York, for 150 distributors and dealers from Metropolitan New York, New York State, and New England, Lawrence Smith and Carl Widney, merchandising and advertising counsellors for the company, outlined the two-weeks' demonstration offer featured as an inducement for the purchase of a Petro burner, and the necessity for giving an unconditioned guarantee on the installation.

This plan had been tried out by several dealers prior to adopting it as a general sales policy and had been an outstanding success. The suggestion also met with favor inasmuch as the company has a five-year record of never having a burner removed after installation.

At the banquet in the evening, W. C. McTarnahan, president of the company, told about his experience in manufacturing oil burners twenty-five years ago, and the trials and tribulations connected with bringing out the first low-pressure burner.

Prof. Collins Bliss, dean of engineering, New York University, P. E. Fansler, associate editor, THE HEATING AND VENTILATING MAGAZINE, and Leod D. Becker, American Oil Burner Association, were the principal speakers.

A similar convention was held in Philadelphia for representatives of the Pennsylvania district.

Chirping of Crickets Indicates Temperature

The rapidity with which crickets chirp indicates, with a high degree of accuracy, the atmospheric temperature, according to a study made by Bert E. Holmes, and reported in the *Scientific Monthly*, Lancaster, Pa. Mr. Holmes has plotted a graph showing the relationship between chirps per minute and the temperature, so that by counting the chirps one can accurately know the temperature. In his report Mr. Holmes says:

"In common with nearly every one brought up in the country, I learned, when quite young, that crickets do not chirp when the temperature approaches the freezing point. During the years 1923-26, I made about 135 observations which prove that a remarkably close relationship exists between the rate of chirping and the prevailing temperature.

"The rule is: 'The prevailing temperature (degrees F.) equals the number of chirps made in 15 seconds, plus 37.' One can try out this rule merely by counting the number of chirps made in a quarter of a minute, mentally adding 37 to the count, and then comparing the result with the temperature as shown by a thermometer. On the average, the difference between the calculated and actual temperatures ought not be greater than one degree.

"The upper section of the accompanying diagram shows the formula expressed as a straight line. This line starts at the left edge at about temperature 37° and rises as it proceeds toward the right edge of the diagram. It will be seen that this line rises about 1° for every four chirps per minute that it moves to the right—just as the cricket makes about four chirps more per minute for each degree which the temperature rises.

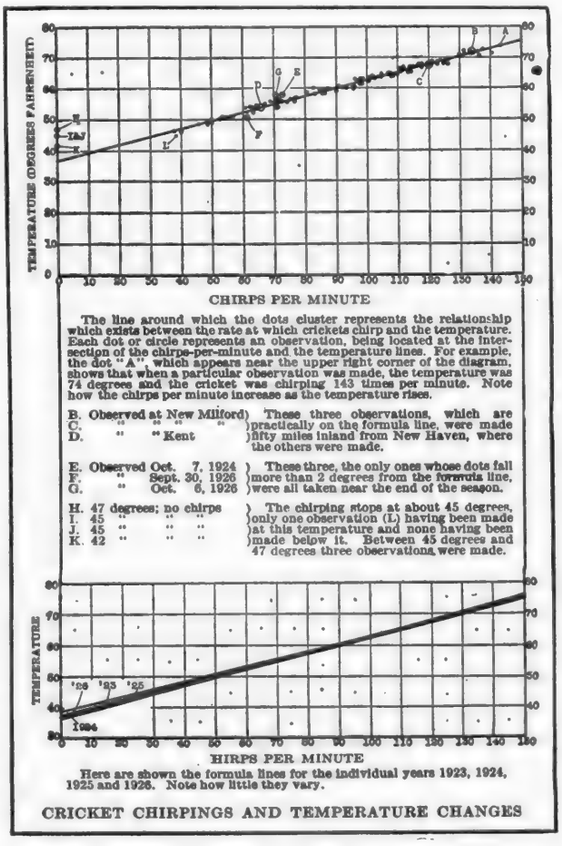
"The remarkably close relationship between the temperature and the rate of chirping holds over a range of about 30° in temperature, or from the summer temperature of 75° or so which prevails when the first cricket peeps, down to about 45° —which signals the arrival of fall and puts an end to the chirping.

"For a time, I suspected that significant deviations from the formula line might be due to excessive moisture in the air, this causing the crickets either to speed up or slow down. This is not so. Crickets will continue to chirp during a drizzling rainstorm. In fact, they are stopped by only a reasonably heavy shower. When they are forced to stop because of rain, they very frequently quit for the evening, even though the latter part of the evening be clear—but as long as they chirp at all, they chirp at the standard rate for the prevailing temperature.

"Some of the deviations from the regular rates of chirping doubtless are due to differences between individual crickets; but the principal cause of fluctuations in rates is, I believe, differences between the conditions under which the chirps are made. Upon one occasion, the cricket under consideration may be beneath a stone or pavement, which has retained heat obtained from the sun; while again, he may be out in the open air in the pathway of a breeze.

"It is strange that although during the fall I invariably was able to find crickets by the dozen during the day, it was only upon most infrequent occasions that I could hear more than one or two chirping in the evening.

"Here is a wonderfully interesting phenomenon! These little creatures, the crickets, are with us for nearly two months during the late summer and early fall of each year; meanwhile chirping practically every evening, in places innumerable. And the frequency with which all the resulting chirps are made is controlled by something outside of the crickets themselves! 'Why?' one asks. But the answer to this question, like the answers to the other interesting questions regarding the subject which crowd into the mind, must await the result of further investigation."



The line around which the dots cluster represents the relationship which exists between the rate at which crickets chirp and the temperature. Each dot or circle represents an observation, being located at the intersection of the chirps-per-minute and the temperature lines. For example, the dot "A", which appears near the upper right corner of the diagram, shows that when a particular observation was made, the temperature was 74 degrees and the cricket was chirping 143 times per minute. Note how the chirps per minute increase as the temperature rises.

B. Observed at New Milford
C. " " " "
D. " " Kent
These three observations, which are practically on the formula line, were made fifty miles inland from New Haven, where the others were made.

E. Observed Oct. 7, 1924
F. " Sept. 30, 1926
G. " Oct. 6, 1926
These three, the only ones whose dots fall more than 2 degrees from the formula line, were all taken near the end of the season.

H. 47 degrees; no chirps
I. 45 " " "
J. 45 " " "
K. 42 " " "
The chirping stops at about 45 degrees, only one observation (L) having been made at this temperature and none having been made below it. Between 45 degrees and 47 degrees three observations were made.

Here are shown the formula lines for the individual years 1923, 1924, 1925 and 1926. Note how little they vary.

CRICKET CHIRPINGS AND TEMPERATURE CHANGES

Fuel Experts to Gather in Cleveland

The Second National Fuels Meeting, under the auspices of the Fuels Division of the American Society of Mechanical Engineers, to be held in Cleveland, O., September 17-20, 1928, will feature many papers by outstanding engineers and scientists in the fuel and power fields. In addition to the technical program, arrangements are being made for a number of interesting inspection trips to the leading plant in the vicinity.

Participation in these meetings is not limited to the membership of the A.S.M.E.; the program is especially arranged for those interested in the production, distribution or utilization of fuels.

A. B. P. Contest for Editorial Awards to be Repeated

The contest for editorial awards which was inaugurated by the Associated Business Papers last year also will be carried on this year. Material published during the calendar year of 1928, will be judged for editorial merit. Some changes may be made in the classes of material carried in A.B.P. papers for which prizes are awarded and also in the method of judging.

Details regarding this second contest will be announced at a later date.

New Pipe Mills in Operation

Bethlehem Steel Company is operating all the units of its new pipe mills at Sparrows Point, Md. These comprise two butt mills, for the manufacture of butt-welded pipe from ⅛ in. to 3 in. in diameter; two lap mills to manufacture all sizes of lap-welded pipe from 2 in. to 16 in. in diameter, and a galvanizing department with auxiliary equipment.

In these new facilities there are deep-water docks available to the ocean steamers, permitting direct shipment by water to foreign or coast ports; three trunk-line railroads and a new modern warehouse, 640 ft. by 110 ft. The plant has been designed so that shipments are made direct from each mill without entering the warehouse, special trackage to the finishing departments being provided for this purpose.

At the annual meeting of the Heating and Ventilating Golf Association of Philadelphia, election of officers resulted in the following: President, Charles P. Hackett; first vice-president, Charles J. Williams; second vice-president, Warren P. Culbert; secretary, R. C. Bolsinger, re-elected; captain, William Culbert, re-elected. Board of governors: Lee Nusbaum, Thomas Cooper, John Moore, Thomas Dormer and C. W. Wanger.

Death of John H. Kinealy

John H. Kinealy, charter member and past president of the A.S.H. & V.E., died at the Christian Hospital, St. Louis, May 6, at the age of 64. He was well-known as a mechanical engineer, patent expert, and inventor of several devices used in heating and ventilation. He graduated from Washington University with the degree of M.E., and since graduation he was instructor in engineering at Washington University, associate professor of engineering at the Agricultural and Mechanical College of Texas, then for three

John H. Kinealy

years he was professor of mechanical engineering at the North Carolina College of Agriculture and Mechanical Arts, and in 1892, returned to Washington University, in St. Louis, as professor of mechanical engineering. He retained this chair at the university until 1902, when he went to Boston to practice as a consulting engineer. After several years in Boston he returned to St. Louis and practiced his profession in that city, where he had been active ever since.

Professor Kinealy was very active in association and community affairs, and served the American Society of Heating and Ventilating Engineers as its president in 1901. For a great many years, commencing in 1896, he was chairman of the society's Committee on Standards and contributed numerous papers to the Transactions. He served on the Council and on a great many society committees. He was a past president of the St. Louis Engineers Club, a member of the Franklin Institute, and the Royal Society of Arts (England). He was active in the Tuberculosis Society of St. Louis, the League of Municipalities of St. Louis County and served this latter organization as president from 1918-23. From 1913-23 he was mayor of Ferguson, Mo., where he made his home. He belonged to the City Club of St. Louis, the Circle Club and the Ferguson Country Club.

Professor Kinealy was the author of many articles and scientific papers on heating, ventilation and hygiene, and was the author of the following books: Steam Engines and Boilers, 1895 (4th edition 1903); Charts for Low Pressure Steam Heating, 1897; Formulas and Tables for Heating, 1889; Slide Valve Simply Explained, 1899 (American edition); Centrifugal Fans, 1905, and Mechanical Draft, 1906.

He was one of the original stockholders of THE HEATING AND VENTILATING MAGAZINE.

IRA HOBART SPENCER, founder and president of the Spencer Turbine Co., Hartford, Conn., died April 28, at the age of 54. Mr. Spencer was an inventor and one of the leading authorities of the country on blowers and exhausters. A Spencer water motor, developed by him in 1892, is still used to pump the organ in a church in Hartford. In 1895, the Spencer Motor Company was organized, then sold to L. E. Rhodes Company, and later became the Organ Power Company. In 1904, Mr. Spencer began experiments with stationary exhausters for cleaning buildings by the vacuum method, following which he organized the Spencer Turbine Company. In 1918, the two Spencer companies were consolidated as the Spencer Turbine Company, with Mr. Spencer as president.

A. S. MAPPETT, treasurer of the Fowler & Wolfe Mfg. Company, died April 8. He was a charter member of the A.S.H. & V.E., and well-known in the heating industry. Mr. Mappett was connected with the American Boiler Company, then the Richmond Stove Company, and in 1899, joined the A. A. Griffin Iron Company, which company later was absorbed by the American Radiator Company.

Detroit Engineering Society Elects Officers

Officers of the Detroit Engineering Society, for the fiscal year 1928-29, are: President, Charles J. Peck; first vice-president, J. P. Hallihan; second vice-president, E. M. Walker; secretary-treasurer, F. A. Kimmich; members of executive committee at large, William F. Zabriskie, P. W. Thompson and H. L. Walton.

At the regular meeting of the society, May 11, Hon. Ira W. Jayne, judge of the Circuit Court, gave a talk on "What an Engineer Ought to Know about His Own Business."

Chicago Association of Tank Manufacturers, at 120 West Madison St., Chicago, has been organized by manufacturers in the Middle West. Officers elected are: President, Martin Maloney, Kewanee Boiler Company; treasurer, William J. Katzberg, Chicago Steel Tank Company; secretary, L. E. Crooks, Chicago Boiler Company. Charter members of the new association are: Kewanee Boiler Company, Chicago Steel Tank Company, Graver Corporation, Steel Tank & Products Company, Milwaukee Reliance Tank Works, Chicago Boiler Company, Leader Iron Works, and John Wood Mfg. Company.

New Apparatus and Appliances

Trane Under-Window Concealed Heaters

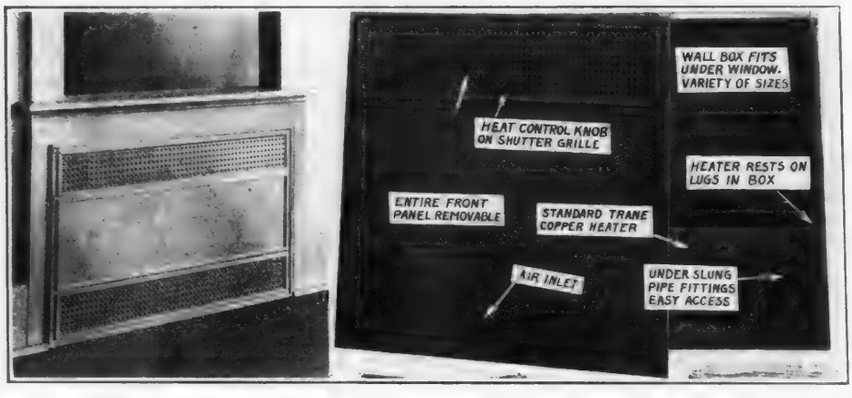
In developing concealed radiation to be placed under windows, The Trane Co., LaCrosse, Wis., has worked out a complete unit that can be installed entirely by the heating contractor without assistance from a sheet metal worker, plastering contractor or carpenter. The only requirement is the provision for a definite amount of space beneath the window sill.

The complete unit consists of a metal wall box, which acts as a stack to guide the flow of heated air from the heater out into the room; the copper heating unit, and the front panel, which covers the opening that is left in the wall. This is a metal panel with perforated opening at the bottom for the inflow of air from the room, and a perforated outlet at the top for the heated air. This design makes access to the heater possible by simply removing the front panel.

When the building is ready for the installation, the heating contractor simply slips the wall box into position, places the heater on two lugs in the wall box, and makes two piping connections. After this he fastens the front panel to the wall box by use of screws, the entire installation in most cases requiring less work than the installation of a cast-iron radiator.

Temperature control is secured either by use of a shutter-type grille, installed back of the heating outfit and operated by a small knob on the outside, or by the use of a control valve on the heating unit.

While this unit is designed particularly for use under windows, it also can be installed in any wall in the room. It is made in a variety of lengths and heights to meet general requirements and in fact, can be furnished for almost any window heights desired. The outfit is furnished in four widths, 4 in., 6 in., 8 in. and 12 in. for installations in various types of walls. The 4-in. unit and the 6-in. unit can be installed in standard walls without furring. The 8-in. and 12-in. heaters usually are used in connection with window seats, although they can be used with the higher stacks in the walls and a very beautiful installation made by using a panel effect on the furring. These units are available in capacities from 6 sq. ft. to 100 sq. ft. in standard sizes. Larger capacities may be provided for special requirements.


WALL BOX FITS UNDER WINDOW. VARIETY OF SIZES
HEAT CONTROL KNOB ON SHUTTER GRILLE
HEATER RESTS ON LUGS IN BOX
ENTIRE FRONT PANEL REMOVABLE
STANDARD TRANE COPPER HEATER
AIR INLET
UNDER SLUNG PIPE FITTINGS EASY ACCESS

Trane Concealed Units Installed Under Window

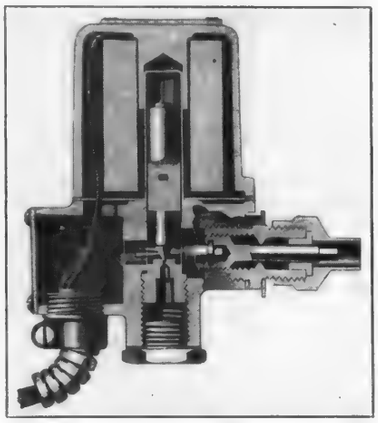
Details of Trane Concealed Heater Units

Arco Electrically-Operated Valve

A new solenoid-operated valve for oil, gas, water or air, recently has been placed on the market by the American Radiator Co., New York, for applications in the oil-burner, refrigeration and general industrial fields.

Arco Solenoid Valve for Oil, Gas or Water

Interior construction is shown in a cutaway illustrating the function of the metering valves to control the main and by-pass flow, permitting flexible adjustments for minimum and maximum requirements. Electric current is brought into an outlet box cast integrally with the valve body. Regularly furnished for use in connection with high-voltage Mercoid temperature, pressure or vacuum controls, this valve also is available to tie in with other high and low-voltage circuits.



Sectional View of Arco Valve

The Arco valve has great lifting power, normally operating against a 50-lb. pressure and, with slight modifications, it is available to operate on higher pressure. Pipe connections are ⅜ in. The valve will handle 80 gal. of water per hour at 50-lb. pressure, or 140 cu. ft. of gas per hour at 3-oz. pressure. The valve body is brass, with replaceable stainless-steel valve seat. A stainless-iron plunger contained within a brass housing "floats" when the current is on, thus eliminating hum or chatter when used on alternating current. A water and acid proof compound entirely surrounds the coil, preventing sweating and possible short-circuiting. Current consumption averages 7 watts. A tight seat is assured as the valve is closed with the fluid pressure.

A Simplified Pumping Trap

A pumping trap in which the pressure and vent valves are controlled by means of a small piston valve, has been placed upon the market by the W. B. Connor Co., Inc., 369 Lexington Ave., New York, and is known as the Shortt automatic pumping trap. Through the use of the piston-valve control it has been possible to simplify the design and construction, eliminating the need for a pivoting and counter-weighted receiver.

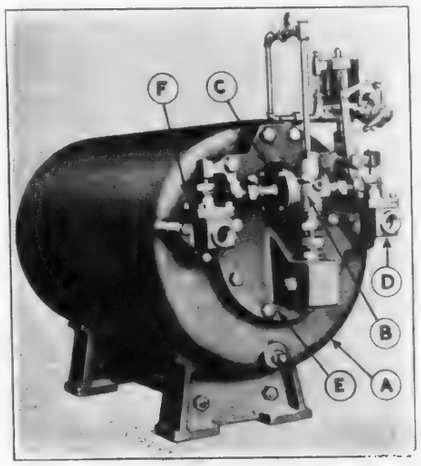
On the head of the stationary receiver is fastened a plate on which are mounted all of the operating valves, leaving nothing but a float inside of the receiver.

When the receiver fills the float rises, opening the cylinder control valve B. This allows steam or air to flow into the operating cylinder C and operate the piston inside this cylinder. In its movement, this piston first closes exhaust valve F and then opens high-pressure steam valve D. High pressure steam then flows into the receiver through port E in receiver head, forcing out the liquid. When the liquid has lowered to the sealing level, the float, going down, opens cylinder control valve B, admit-

ting steam to cylinder control valve B and reversing the direction of movement of the piston. In moving back the piston first closes high-pressure steam valve D, shutting off steam from the receiver, and then opens exhaust valve F. This allows condensate or other liquid to flow again into the receiver.

Since the liquid, during discharge, is forced out as fast as the live steam flows in, the pressure in the receiver never builds up to a point much above that of the steam itself. Also since the steam used to discharge the liquid is vented back to the unit being drained no steam is lost and the amount of steam consumed is very small.

It is claimed that the piston operation of the pressure and vent valves results in a quicker and more positive action and that, because of the instantaneous full-opening of the steam valve, there is no "wire-drawing."



Piston Valve Control Reduces Parts and Simplifies Action of Shortt Pumping Trap

The trap functions equally well on steam or air. It has many applications including the pumping of high and low temperature liquids such as oil, condensates, acids, gasoline, etc., the draining of condensers, dry kilns, blast coils, vacuum pans, water heaters, receivers, paper machine dryers, etc., and the feeding of boilers.

The trap is made in four sizes with inlet and discharge pipes from 1½ in. to 4 in. diameter, and capable of handling from 7500 to 23,500 lbs. per hour.

New Features of Monroe Oil Pumps

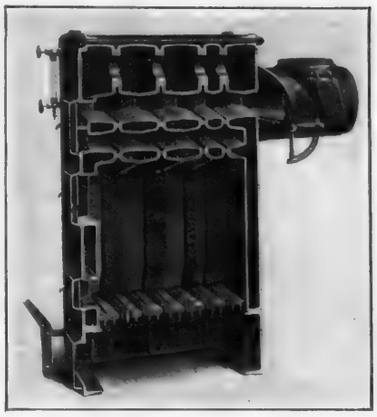
Rust-resisting brass cylinders now are being used in place of iron cylinders on Monroe oil pumps, as it was found that, in several instances, water had entered the outside supply tank and from there had been drawn into the pump, rusting the cylinder walls. An additional refinement is the leak-proof tanks, punched from a single sheet of drawn metal with no welded seams. These pumps are manufactured by the Janette Mfg. Co., Chicago.

Richmond Announces "Model" Boiler

A new boiler, built in capacities from 300 to 7500 sq. ft., is announced by the Richmond Radiator Co., 1480 Broadway, New York. This boiler is of independent sectional construction, each section carrying its own grate and proportion of flue surface. Seventy-nine per cent of the surface is vertical and self-cleaning. This model is designed to provide for a rapid flow of water in the overhanging surface, which induces rapid steaming and insures a steady water line. The steam space is sufficiently deep and wide to furnish dry steam at all times. The boiler is end-fired and is an adaptation of the Model side-feed boiler. The new "Model" boiler will be built in 15-in., 22-in. and 36-in. grate widths.

National Simplex Air Filters

An air filter of the rotary-drum type, using a viscous fluid and utilizing the periodic rotation of the drum to provide for cleaning the dirty surfaces, is announced by the National Air Filter Co., 5130 Ravenswood Ave., Chicago. This filter, known as the Simplex, consists of a drum horizontally mounted above and dipping into a tank, with provision made for rotating the drum either by hand or by mechanical means whenever it is desired to clean the working portions of its surface. The filtering medium is arranged in two stages. The inside stage is a knitted copper mesh, wound continuously around the supporting screen of the drum. This provides the final stage

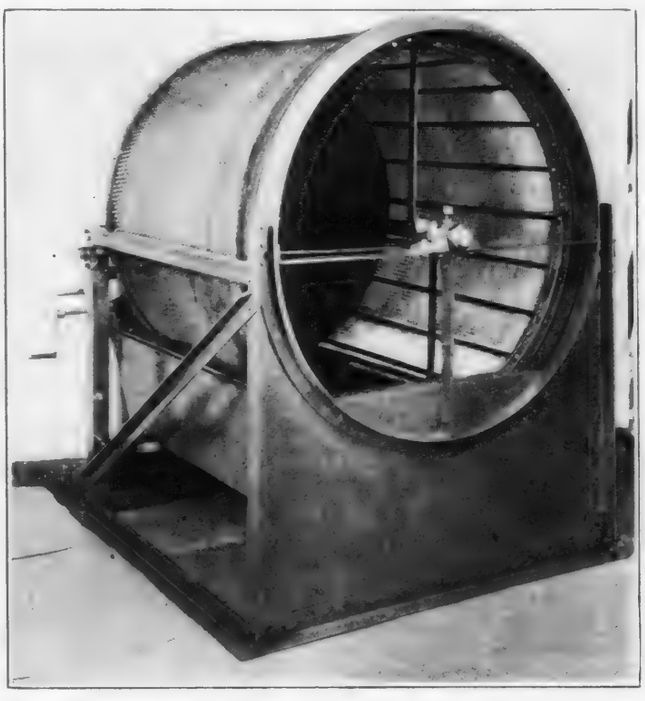


Richmond Sectional Boiler

of cleaning, removing the finer sooty particles in the air. The outside element consists of several layers of expanded metal of a special design, with close meshes and fins set at 45° angles. The heavier particles impinge on this surface and are held by the viscous fluid.

One segment of the drum is always immersed in the oil and for sufficient length of time to give it a thorough cleaning by solvent action. The drum is turned periodically, once a week being sufficient under average conditions. The cleaned segment is thus brought into service and a dirty segment takes its place in the oil.

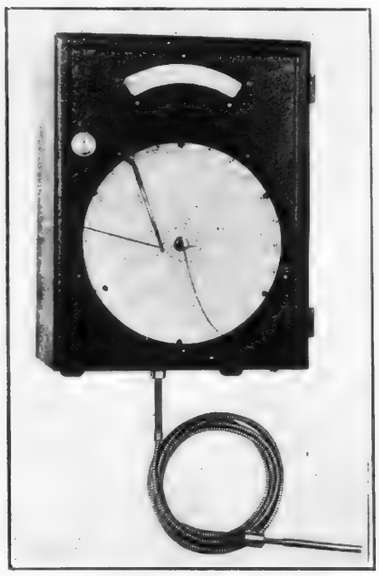
The dirt drops by sedimentation to the bottom of the reservoir and the top oil is always clean. The sediment may remain in the tank for an indefinite period, depending on the condition of the air handled. Once in six months is sufficient for removal under average conditions. The total servicing needed to keep the Simplex working at top efficiency is less than 3 hours per year under extreme conditions.



National "Simplex" Air Filter

Combination Recorder and Contacting Controller

Combining, in a single case, the features of a recorder and a thermometer controller, The Bristol Company, Waterbury, Conn., announces its Model 267. This is a single-pen recording system



Bristol Model 267 Combination Recorder-Controller

and controller system, with scale mounted directly above it. The recording pen and moving contact of the controller each is actuated by separate pressure elements, which are exactly alike in construction. These elements are connected, through a single capillary tube, to the sensitive bulb, and arranged in this way the record is not impaired in the slightest degree by the retarding effect of the controller. The controlling element is arranged for a contact capacity of 1000 watts by equipping it with self-contained automatic switches. Terminals are supplied for making easy connections to line and control apparatus through conduit, all internal circuits being heavily insulated.

Triad Boilers

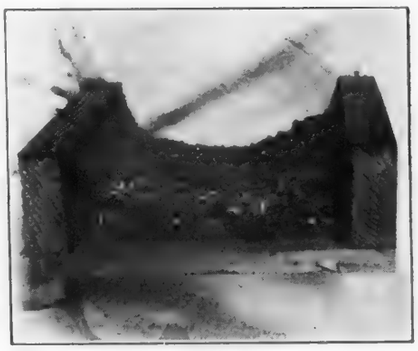
An interesting combination of equipment is supplied by the Titusville Iron Works Co., Titusville, Pa., in which a Titusville all-steel, return tubular portable firebox boiler is combined with a submerged-coil type water heater and a forced draft system, known as the Lokol burner, for burning buckwheat coal. This equipment, with necessary control, is sold as a unit and is designed to produce heat from the smaller sizes of anthracite coal, or, if desired, from bituminous slack. Triad boilers are built in sizes from 1500 to 33,000 sq. ft. of radiation. The water heater is made of copper tubing to eliminate rust, and is installed just below the water line of the boiler ready for connections to the domestic water service main. With this device a banked fire will maintain the necessary temperature of service water. The Lokol burner, with complete automatic control, is used with extra-heavy dumping type grates, which may be had for use with No. 1, No. 2 or No. 3 buckwheat coal.

Spraying Insulations on Building Structures

Application of insulation material to buildings, through the medium of a "gun," has been developed to a point where this method is being extensively applied in many of the larger cities. Equipment is manufactured and licenses are issued by Sprayo-Flake Insulating Co., 56-64 South Bay St., Milwaukee, Wis.

Prepared paper, somewhat resembling "confetti," except that the fragments are irregular in shape, mixed with a definite amount of asbestos fibre, is delivered in dry form to the building to be insulated. The insulating plant consists essentially of a portable air compressor, from which air is supplied, through a 30-ft. length of flexible hose of large diameter, to a spray gun, to which also is carried a hose conveying the fluid used to bind the insulating material.

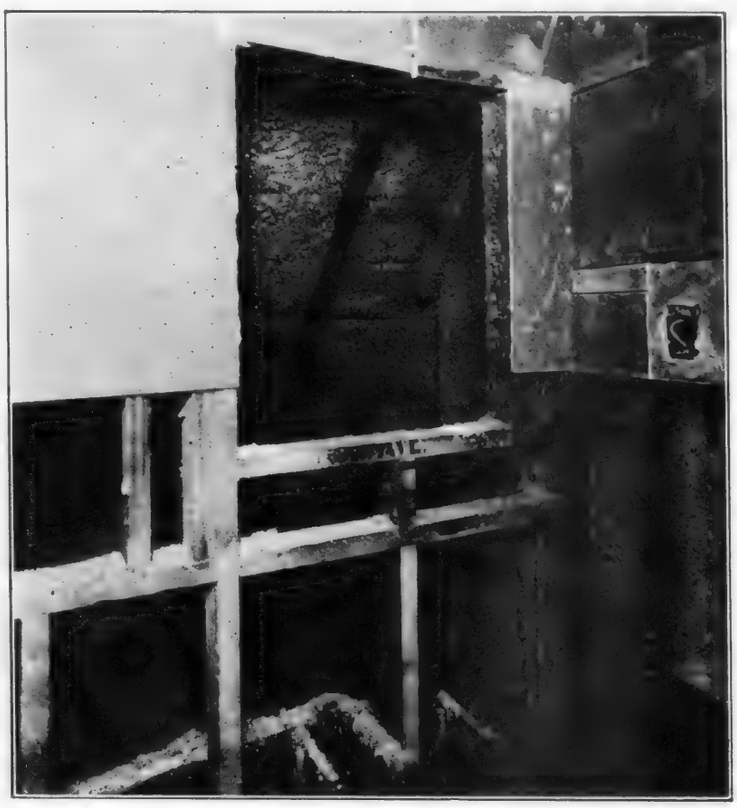
The shredded paper and asbestos mixture is placed upon a hopper where it is shredded, and, through the medium of a motor-driven Vorclone fan, is blown through the flexible tube. At the mouth



When Sprayo-Flake Is Applied It Naturally Forms Fillets in the Angles

of the nozzle it is met by an atomized spray of silicate of soda, the gun being directed against the surface to be insulated.

Through proper regulation of the air pressure and the supply of raw materials, the insulation is applied to the surface in a somewhat sticky and very fluffy condition, which is quickly altered as the liquid binding material evaporates, leaving a tough and spongy mass. The depth to which the insulation is applied is under the control of the operator, standard practice being the application of 1 in. thickness in the walls and 2 in. on the ceilings. Additional thickness can be applied by the operator in a single operation. The sticky character of the applied insulation causes it to adhere readily, and the slight impact drives it into crevices and cracks. One of the features of this method of applying



Sprayo-Flake, Applied with a "Gun," Is Literally Driven Into Every Crack and Crevice in the Most Vulnerable Part of a Frame Building—the Eaves

insulation is the fact that the most difficult portions to insulate and those most susceptible to leakage and infiltration,—that is, directly under the eaves—are easily reached and insulated by means of the gun. An interesting feature is the speed with which the house can be completely insulated with Sprayo-Flake. The capacity of the machine is 2000 sq. ft. per day, applied 1 in. thick, so that the average house can be completely insulated in less than two days.

It is stated that the cost of insulation by this method is so low that a large part of the initial expense can be absorbed by the saving in the heating plant required. Indicative of the results that can be obtained with this method of insulation, a letter from a prominent mid-western manufacturer is quoted:

"In 1925 it was necessary to convert 13,000 sq. ft. of our warehouse into factory use. The building was of steel construction with sheet metal sides and roof. During the winter of 1925 our workmen in this building were very uncomfortable and inefficient due to the cold, even though we installed three large heating units burning six tons of coal per day.

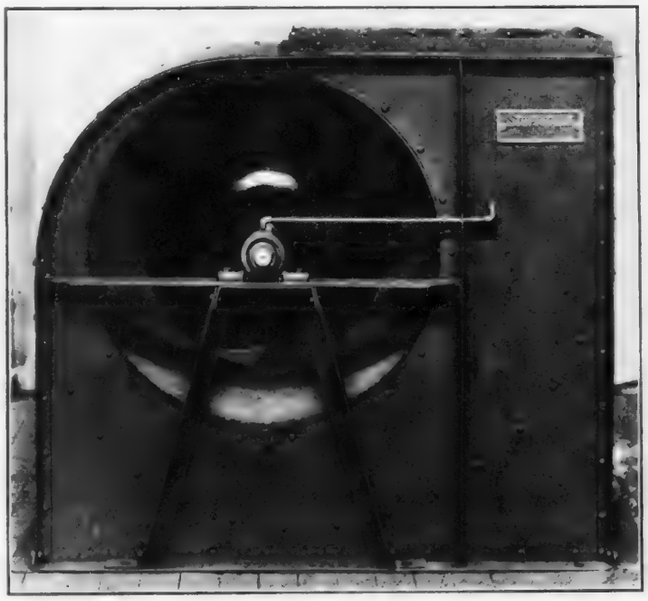
"It was necessary to insulate the building before another winter, consequently all types of insulation were considered. Our problem not only seemed to be a very expensive one, but also left a doubt in our minds as to whether or not the results obtained would be sufficient to even warrant the large expenditure.

"The insulation applied by the gun method solved the problem. Your mechanics applied Sprayo-Flake direct to the sheet metal (1 in. in side walls and ⅝ in. on ceiling) without interrupting factory operations.

"Our factory is now warm and quiet, with perfect working conditions. It was found that we could safely remove two of the three heating units, and easily heat the space with one-third the amount of coal previously consumed.

"We are now passing through the second winter and the insulation is in perfect condition, even though open or unprotected on the inside. Particularly worthy of note is the fact that our line shafts are connected to the same steel beams as the sheet metal roof, the under side of which is sprayed with the ⅝ in. of insulation. This continued vibration has not affected the efficiency of the insulation."

Applying Sprayo-Flake Insulation to Interior of a Frame Dwelling



Sturtevant Sturdivane Fan Follows in Design the Fans in the Hudson Tunnel

"Sturdivane"—A High-Speed Ventilating Fan

Following the general design of huge ventilating fans in the Hudson Tunnel, the "Sturdivane" fan is announced by the B. F. Sturtevant Co., Hyde Park, Boston, Mass. This fan is for general use and is so designed that the wheels can be over-hung on an extended motor shaft, making a self-contained motor-driven unit which can be set on a silencing frame. A large air outlet permits air movement at low velocity. Overload on the motor is prevented by the self-limiting horse-power characteristic. The fan is mounted in ball bearings, reducing the friction load of the unit.

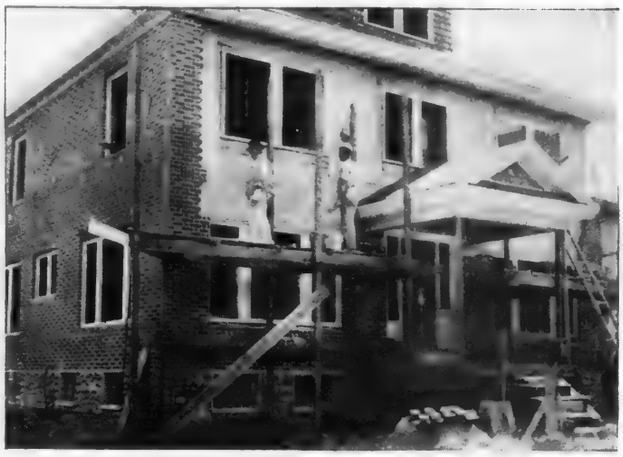
Broomell Diaphragm Float Vent

A vent valve, simple in construction, positive in action, designed to evacuate air freely and yet to close quickly against vapor, steam or air, is announced by the Vapor Heating Co., York, Pa.

The valve consists of a cylindrical chamber, into the lower part of which is fitted a Broomell thermostatic diaphragm. Above the diaphragm, and actuated by it, is a copper float having a hemi-spherical ball with a guide pin valve stem attached to its top. Above the air outlet, which is formed in the cover, is a knife-edge valve seat upon which is placed a vacuum-disc. This disc is made of special aluminum alloy in such a way that it will retain its shape under all conditions of heat. The face of the disc is ground and polished, insuring a tight seat, thus eliminating the sticking of the valve on its seat.

In operation, when vapor or steam is admitted to the apparatus to which the

vent is attached, the air lifts the disc from its seat and escapes through the orifices in the cap. When the air is all expelled, the disc falls back on its seat and closes the interior of the device to the atmosphere. The vapor or steam entering the vent expands the diaphragm, which action lifts the float and closes the air outlet in the cap, making it impossible for the vapor or steam to escape. If condensation reaches the vent, it lifts the float and again closes the air outlet, making it impossible for the condensation to escape. The vent is made in ⅜-in. and ¾-in. spud size.



Constructing a Brick Veneer Home with Sisalkraft Insulation

Sash-Operated Room Temperature Control

A sash-operated control of room temperature, for use in conjunction with thermostatic control, has been developed by C. C. McDermott of the McDermott Water Heaters, Inc., New York. It is designed to maintain a given temperature, provided the windows are not opened too far.

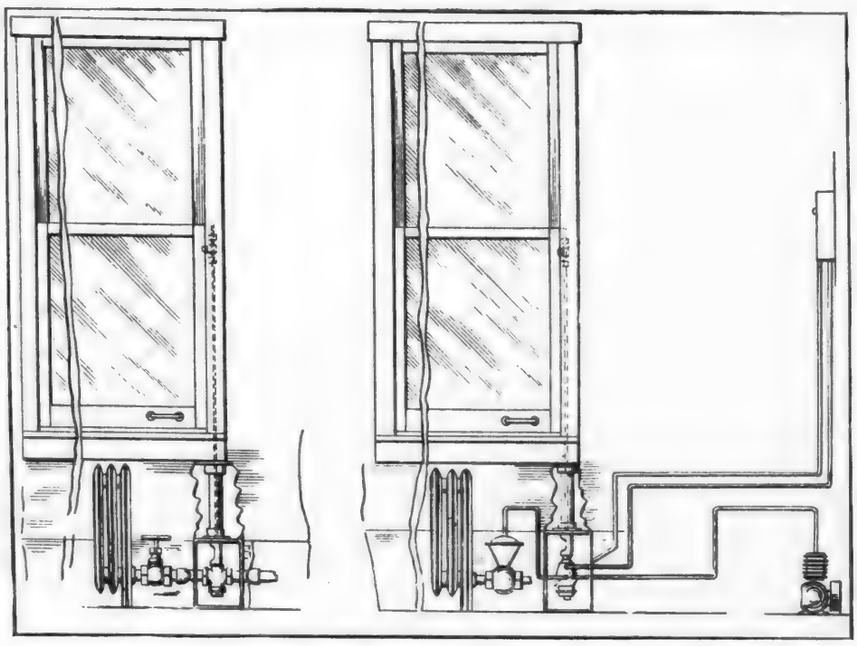
Heretofore, there has been no regulation of this heat loss through open windows. However, we often see hotel and office building windows open from 2 in. to 2 ft. with the outside temperature at the freezing point. These windows were opened because the room was too warm. In all probability the thermostat controlling the temperature was not set for a lower temperature.

Hotel rooms often are vacated with windows open. In such cases, the thermostat, instead of effecting a saving, is trying to maintain the temperature for which it is set. The temperature of the room may be 50° F. but the radiator valve is wide open.

Through the application of the method here described, it is possible to secure positive action through an inexpensive device that will permit the thermostat to function in a normal manner with the window opened to a predetermined point but which will shut off the radiator valve when the incoming cold air becomes excessive. The device can be installed in the window frame and is not visible. The construction prevents it from being reached except through a box in the baseboard which is locked. All adjustments are made in this box. The occupant opens and closes the window in the usual way.

The cost of the sash-operated control adds about one-third to the cost of the thermostatic control. It comprises a spring-loaded plug air cock and two moving parts to operate the air cock. No energy is used, other than a load, by actual spring test, of 1½ lb. upon the two arms operating the sash.

Patents covering various methods of control of radiator valves through movement of the sash are now pending.



Arrangement for Controlling Room Temperature with Windows Open

Sisalkraft—a New Material to Decrease Infiltration

A newly-devised material, consisting of two layers of asphaltum-coated paper, reinforced by two layers of strong sisal fibres which run crosswise in both directions between the paper layers, is called Sisalkraft, and is manufactured by The Sisalkraft Co., 228 North LaSalle St., Chicago, Ill. An application of the material, which comes in rolls, is of interest to heating and ventilating engineers, as this material is air-tight and has some degree of heat-insulation value. It has been found to be an excellent material for covering houses under a brick veneer as, when properly put on, the material is practically wind-proof. An important feature in connection with the use of Sisalkraft in installation is its strength. It is so strong that a workman can nail one end of a strip, unroll the length desired, and then nail the other end without the first end tearing loose, even in a strong wind. As much of the cold air infiltration in the average frame house is around the window frame, the use of this material should cut down fuel bills.

Cleghorn Flash Service-Water Heaters

An interesting line of service-water heaters of high-class construction is announced by Cleghorn Co., Boston, Mass. This is a water-tube boiler in which water is contained in headers at top and bottom of the boiler, and in the formed brass coil with which the upper part of the combustion chamber is almost filled. The ratio of heating surface to contained water is so great that this is practically an instantaneous heater. It is built in three sizes, 12-in., 16-in. and 20-in., rated to heat 137, 245 and 483 gal. of water per hour with a temperature rise of 110°. These heaters are especially designed for apartment houses, large residences, hotels, restaurants, hospitals, etc.

New Trade Publications

BARBER PATENTED JET GAS BURNERS are described in catalog No. 28 issued by The Cleveland Gas Burner & Appliance Co., 3702 Superior Ave., Cleveland, O. This catalog is exceptionally well prepared and is replete with illustrations of the various types of Barber burners. One chapter is devoted to the technical features of applying these burners to heating plants of various types and sizes, with diagrams clearly showing the methods of installation in round and rectangular boilers and in warm-air furnaces.

An elaborate tabulation covering 30 pages provides a specification chart which, if observed, will enable the proper selection of a Barber burner assembly

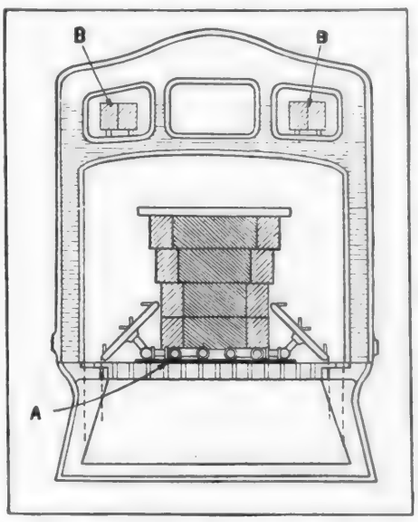


Diagram Showing Installation of Barber Burner in Boiler Designed for Coal

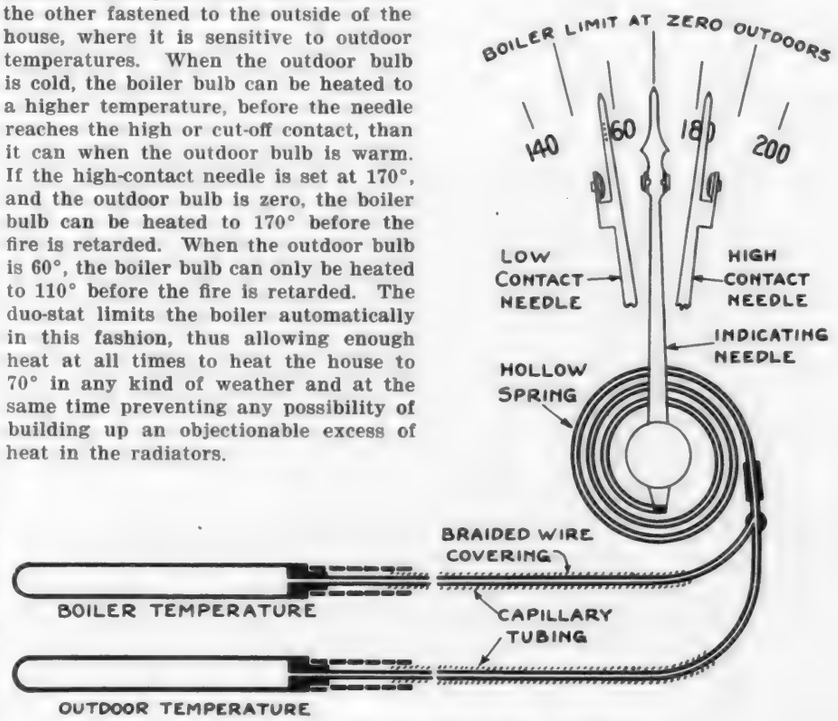
for any fire-box of the dimensions listed. Practically all of the information contained in this catalog refers to the installation of burners and furnaces designed for coal, and the arrangement of refractories has been very carefully worked out to produce the most efficient result. Size 8 in. x 10½ in. Pp. 48.

AUTOMATIC REFRIGERATION FOR YOUR HOME is the title of a bulletin announcing the Williams Ice-O-Matic refrigerating system, manufactured by the Williams Oil-O-Matic Heating Corp., Bloomington, Ill. All-metal cabinets are used, insulated with corkboard sealed against dampness and finished in Duco. Methyl chlorite is the refrigerant, and the compressor is a two-cylinder machine with poppet valves. The motor is rated at ¼ H.P.—1800 R.P.M., and the refrigerating effect is equivalent to 10 lbs. of melting ice per hour when in continuous operation. The refrigerating mechanism is installed in the lower part of the cabinet, and the ensemble is high-class and attractive.

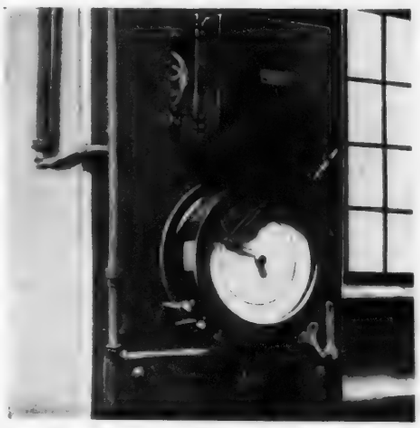
INDUSTRIAL BUILDINGS AT MINIMUM COST TO OWNER is the caption of an interesting circular coming from L. A. Harding Construction Corp., 1335 Main St., Buffalo. This bulletin features standard buildings for industrial use in a wide range of designs, erected with material economy because of the elimination of engineering and architectural fees, of waste in structural material and of untried and experimental designs. Standardization also results in considerable time-savings in the erection of a building, and ultimately means a greater salvage value due to the adaptability to a large variety of manufacturing processes. Standard elements for the fabrication of these buildings are carried in stock. The circular features a building nearly 600 ft. long and over 200 ft. wide designed and constructed in 51 working days for Remington-Rand, Inc., Tonawanda, N. Y.

L. A. Harding, the executive and engineering head of this corporation, has long been known in the heating industry and now is vice-president of the American Society of Heating and Ventilating Engineers.

RAYMOND DUO-STAT is described in bulletin No. 1 issued by F. I. Raymond Company, River Forest, Ill. This device provides for the automatic compensation of water heating systems for outside temperature variations, this being accomplished by a two-bulb double contact thermostatic device, one bulb being attached to the pipe from the boiler and the other fastened to the outside of the house, where it is sensitive to outdoor temperatures. When the outdoor bulb is cold, the boiler bulb can be heated to a higher temperature, before the needle reaches the high or cut-off contact, than it can when the outdoor bulb is warm. If the high-contact needle is set at 170°, and the outdoor bulb is zero, the boiler bulb can be heated to 170° before the fire is retarded. When the outdoor bulb is 60°, the boiler bulb can only be heated to 110° before the fire is retarded. The duo-stat limits the boiler automatically in this fashion, thus allowing enough heat at all times to heat the house to 70° in any kind of weather and at the same time preventing any possibility of building up an objectionable excess of heat in the radiators.



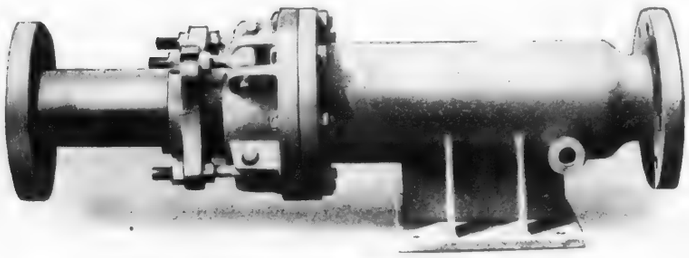
Principle of Construction of the Duo-Stat



Brown Automatic Control on Four Oil-Fired Boilers Heating Conservatories on Estate of Pierre S. du Pont

BETTER INSTRUMENTS AT COMPARABLE PRICES is the title of a little folder issued by The Brown Instrument Company, Philadelphia, Pa. In this folder are illustrated many of the details of construction of the Brown recording thermometers and pressure gauges. An interesting series of photographs shows application of these instruments to almost every conceivable industry.

FOR MAXIMUM EFFICIENCY is the title of a circular issued by the Janette Mfg. Co., 556 West Monroe St., Chicago, descriptive of the Janette special motor. This little unit is used for many purposes, such as addressograph, silk twisting machine, oil burners, and motion-picture projectors. The circular illustrates different types and emphasizes the carefully worked out details of design.



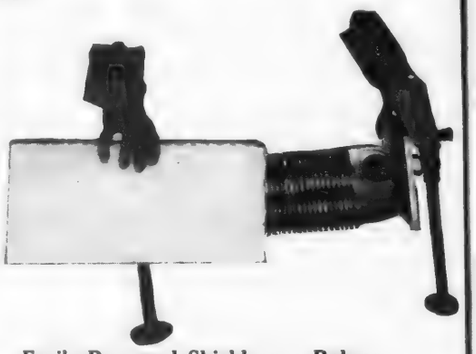
Gradon Double-Expansion Joint

GRADON ENGINEERED PRODUCTS is the title of a loose-leaf catalog prepared by Gradon Mfg. Co., East Tioga & Memphis Sts., Philadelphia. In this catalog are featured a number of specialties for use in the heating field. Bulletin No. 11 deals with wrought construction expansion joints of the sliding-sleeve type. These are made both as single-expansion and double-expansion joints and are designed to meet extreme conditions of superheated steam transmission. Steel flanges are used, drilled standard for 125 lbs. pressure, or extra-heavy for 250 lbs. pressure. The catalog furnishes full dimensional data and prices of these joints in straight, angle-type and 90° double-expansion type. Bulletin No. 12 deals with guided expansion joints, of the sliding-sleeve type, and other bulletins feature steam separators, storage water heaters, in fourteen standard sizes, with voluminous tabulated data on hot water requirements and on the capacities of the water heater to furnish service water at 180° F. An interesting application of heating water with the Gradon Heat Exchanger is that of a laundry using its dirty waste water to preheat to a temperature of 100° all the city water used. A great deal of heat ordinarily thrown away thus is utilized and it is said that the saving in a certain laundry was on the order of a ton of coal a day. Size 8½ x 11. Pp. 36.

GORTON SINGLE-PIPE VAPOR HEATING SYSTEM is the title of Catalog No. 93 issued by the Gorton Heating Corp., 96 Liberty St., New York. In this little pocket catalog is told a story of the Gorton system and of the specialties that are its salient features. Gorton valves, air eliminators and draft regulators are illustrated and described and a section is devoted to the subject of vaporizing old steam jobs. A number of photographs show prominent buildings in which Gorton valves are used.

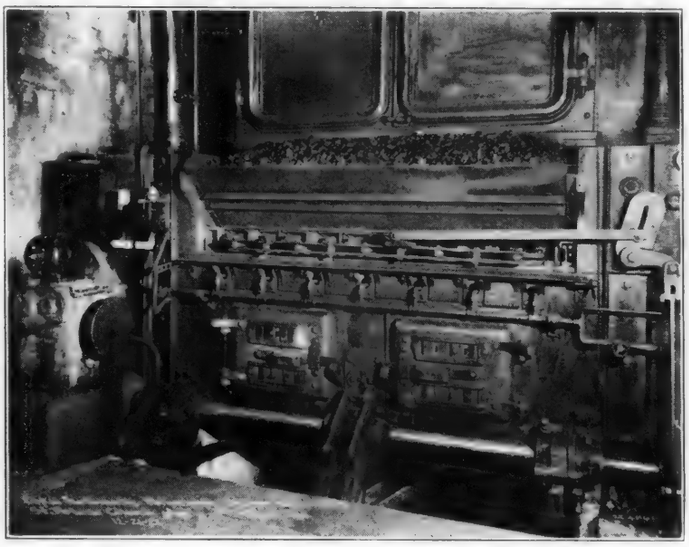
WITHIN THE WALLS is the caption of a brochure issued by the Rome Brass Radiator Corp., New York, and descriptive of Robras concealed radiators. Excellent photographic illustrations and line drawings show the methods of installing these light-weight brass radiators, and several pages are devoted to details showing the construction of the radiators themselves. Suggestions are made, showing how this type of radiation can be concealed under stairs and in other places where space ordinarily would not be utilized. Bathroom units from 5 to 22 sq. ft. in rating, and covered with an easily removed shield, are especially designed for installation behind lavoratories. Robras electric-steam radiators also are featured as a portable type.

Robras Bathroom Radiator



Easily-Removed Shield on a Robras Radiator

NATIONAL SOOT BLOWER is featured in a circular issued by the National Flue Cleaner Co., Inc., Groveville, N. J. This device is installed on horizontal-return tubular boilers, is operated from the floor level and can be used while the boiler is in full operation without interfering with cleaning. The boiler tubes are divided into four sections, each of which is cleaned separately the operation being governed by a 4-way valve and requiring only a few seconds. It is suggested in a circular that the installation of stack thermometer, to measure flue-gas temperatures, will indicate a material increase in boiler efficiency, due to greater absorption of heat when the flues are kept free from soot. It is recommended that every tube be blown twice daily in order that maximum efficiency may be secured.

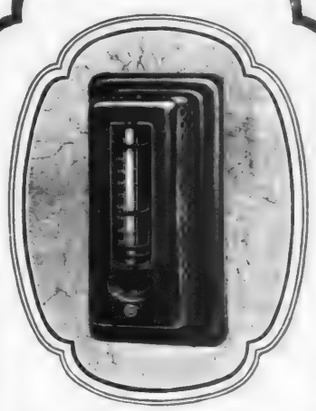


CoKal Automatic Pulverzone Stoker Operated by ⅓ H.P. Electric Motor

COKAL AUTOMATIC STOKERS are described in an illustrated sheet issued by the CoKal Stoker Corporation, 910 Wrigley Bldg., Chicago. This stoker is designed to replace the fireman in medium-sized heating plant installations. Although nearly all of the Pulverzones installed are used with natural draft, they also operate successfully with forced or induced draft.

BROS RIVETED FIREBOX HEATING BOILERS are described in Catalog No. 24 issued by Wm. Bros Boiler & Mfg. Co., Minneapolis, Minn. This company has manufactured steel boilers for more than 41 years and specializes in firebox-type heating boilers. The Type B direct-draft boiler is built in a number of sizes, serving capacities from 850 to 13,300 sq. ft. of steam radiation. Another series has a line-up extending to a boiler rated at 28,000 sq. ft. of steam radiation. The catalog illustrates the boilers in detail and assembly and presents both technical and dimensional data in tabulated form.

MASSACHUSETTS MUTUAL LIFE INSURANCE CO.
SPRINGFIELD, MASS.
KIRKHAM & PARLETT, *Architects*, Springfield, Mass.
R. D. KIMBALL CO., *Engineers*, Boston, Mass.
WYCKOFF & LLOYD COMPANY,
Heating Contractors, Springfield, Mass.



The Powers Type D Thermostat

Does not need to be adjusted or overhauled annually. Often gives 15 to 20 years of accurate control without repairs of any kind. Gives true GRADUATED control. Uses only 10% of compressed air required by other thermostats. Costs more. It's worth more!

"The Best Costs Less in the End"

One of the show places of Springfield, Mass., is the large new building shown above. Upon entering it, one is impressed by its symmetry, excellence of design, solidity, and its rugged appearance of durability. Here is a building which will LAST.

Inside, the quality of the mechanical equipment is in keeping with the building itself. In selecting Powers Regulation to control the temperature in this building, the Architect and Engineer have provided their client with a system that gives 15 to 30 years of ACCURATE and DEPENDABLE control without the annual adjustments, repairs, and "SERVICE" bills which so often come with lower *first cost* systems of regulation.

THE POWERS REGULATOR COMPANY
35 Years of Specialization in Temperature Control
2718 Greenview Avenue, Chicago, Ill. **Offices in 37 Cities**

(4112)

POWERS

WELDED PIPING is the title of a brochure prepared by the Linde Air Products Co., 30 East 42nd St., New York. This booklet is devoted to a presentation of the application of oxy-acetylene welding to piping installations in homes and commercial buildings. It is exceptionally well illustrated with photographs showing every stage of installation work in connection with a heating plant. Where brass pipe is used for domestic water systems the same welding process is used, and practically all of the conventional screw fittings can be dispensed with. It is stated that a complete unit that will enable a heating and plumbing contractor to do practically unlimited field work costs less than $175 and, with the addition of a cutting blowpipe, the cost is brought only to a little over $200. The equipment is extremely portable and a photograph shows a familiar Lizzie, ready to move this equipment from job to job.

While this booklet is not intended in any way to be a technical manual of instruction, the description and portrayal of operation are so concise and well-done that it should be of interest to every heating contractor who is following this latest method of fabricating welded piping installations in the home.

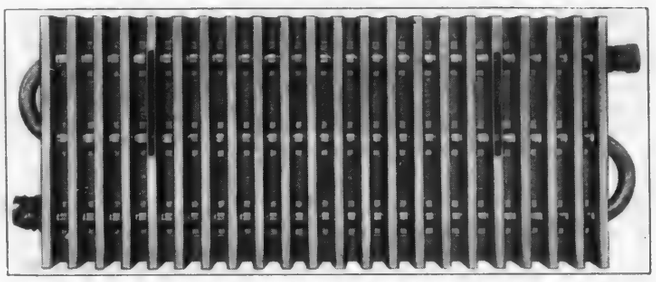
ROTARY PUMPS FOR VARIOUS APPLICATIONS are described in a circular issued by the Beach-Russ Co., 50 Church St., New York. This company has manufactured rotary vacuum-pumps for 28 years and has developed a comprehensive line of vacuum pumps, rotary air compressors, liquid pumps, compressors for oil burner system, pumps for heating plants, pressure blowers and fuel-oil pumps. Brief descriptions of the different lines are presented; also photographs and tabulated data.

HIGHER EFFICIENCY IN POWER TRANSMISSION is the title of a catalog prepared by Alexander Bros., Inc., 14 South St., Philadelphia, describing "Tentacular" transmission. Tentacular is a power transmission belt having a high adhesion so that it is not necessary to resort to tension in order to secure a satisfactory drive.

Tentacular consists of a backing, made of either oak tanned leather or balata, to the under surface of which are attached narrow longitudinal strips of soft green leather, made by a special process and having extremely high coefficient of friction. These strips are held in position by means of special hollow brass rivets, strongly clinched, and forming a depression or hemispherical pocket on the friction or pulley side of the belt. These pockets remind one very much of the tentacles of the octopus or devil-fish, hence the name of tentacular. This drive will pull practically like a chain although it is a belt. It is adapted to a slow-speed drive where usually the load is very heavy and when there is a high starting torque. However, any high-speed drive from 5000 to 7500 ft. per minute can be well handled. This drive is particularly adapted to conditions where pulley ratios are high and where the space is limited.

The catalog contains much technical information on the design and selection of tentacular drive and the carrying capacity for this form of belting. Tabulated data, formulas and illustrations add greatly to the value of the catalog. Size 8½ in. x 11 in. Pp. 16.

Sturtevant Fan in Large Paper Plant Driven by Tentacular Belt



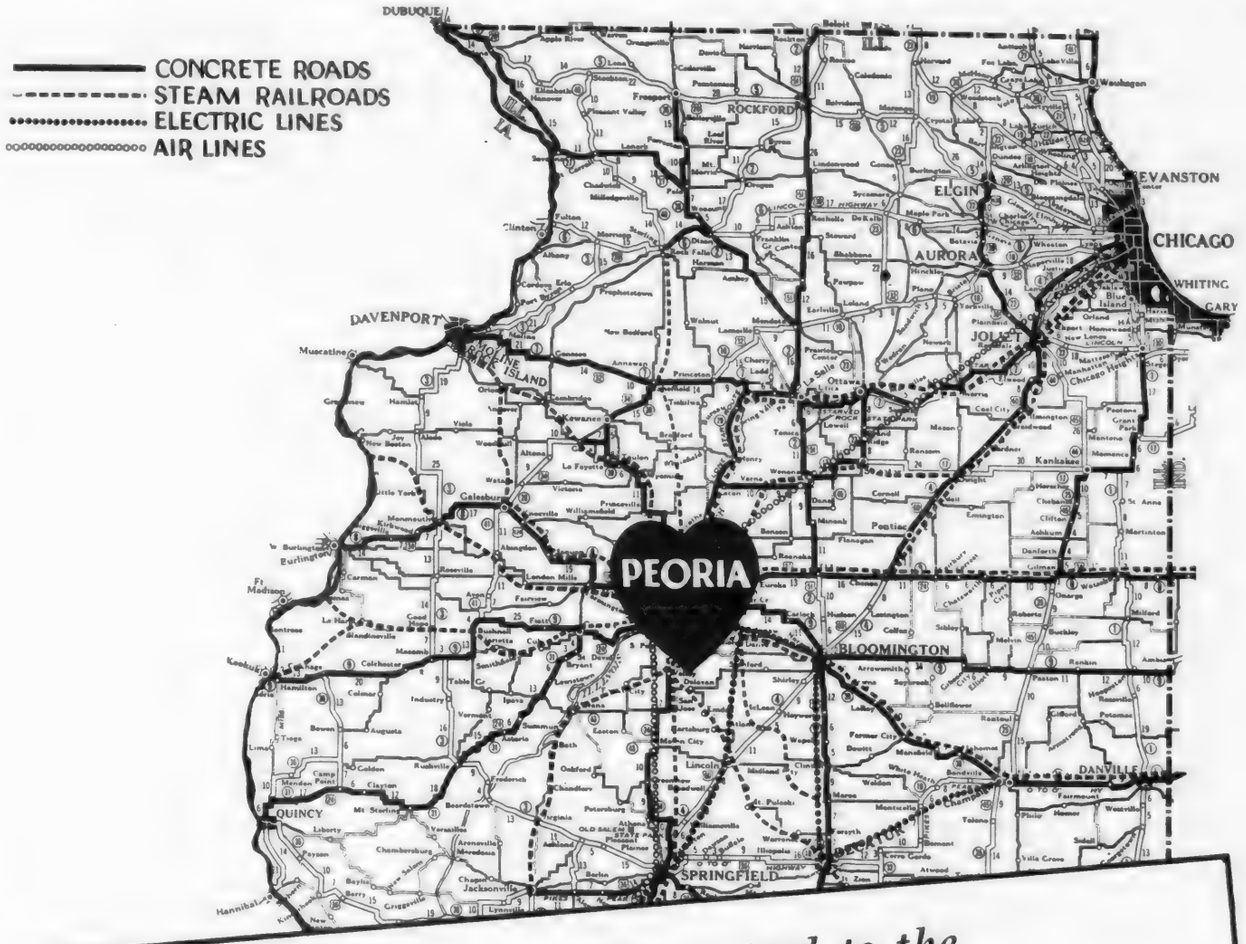
Seamless Copper Tubing and Chimney-Shaped Extended Surfaces of Murray Radiators

MURRAY RADIATORS are described in an elaborate publication issued by the Metropolitan Engineering Co., 1250 Atlantic Ave., Brooklyn, N. Y. The first section of this brochure is devoted largely to architects' drawings of important buildings in which Murray radiators are used. An outstanding example is the Fisher Building, Detroit, planned to be the largest office building in the world.

In the Murray radiator, the steam chamber is a seamless copper tube without joints. This tube is doubled back on itself two or three times, and the extended surfaces, also of copper, so shaped as to form vertical flues, are metallically fastened to the tube, one on each side. This design permits the rapid passage of air through the chimneys formed by the extended surfaces, during which travel heat is absorbed both from these surfaces and from the prime heating-surface of the tube.

Murray radiators can be used on any pressure available for heating purposes and now are in service on 200 lbs. pressure. Each radiator is tested to 600 lbs. pressure before shipment. A number of excellent photographic reproductions show typical installations in office buildings, commercial buildings and residences. The latter portion of the catalog is taken up with tabulated data, presenting technical facts and ratings, which latter have been checked by Prof. E. H. Lockwood, at the Mason Laboratory, Sheffield Scientific School, Yale University.

NEW KLEEN-HEET TYPE 800 BURNER is the title of a booklet, issued by the Winslow Boiler & Engineering Co., 844 Rush St., Chicago, describing a single-size burner unit adjustable through a wide range of nozzle sizes to meet any capacity from 600 to 6800 sq. ft. of steam radiation. With nine different nozzle tips to determine the size and shape of the flame, and eight different nozzle stems to control the volume of oil delivered, there results a combination of 72 assemblies that can be used with the basic unit. A proper selection of nozzle and tip-stem makes it possible to produce a flame adapted to any round boiler, or to any rectangular boiler, regardless of its width or length. This feature, and the wide range in oil-burning capacity, adapts the burner to residences, apartment houses, large garages, schools and churches. The model 800 burner is designed to burn 28°-32° oil, having a flash-point under 190° F. It is listed as standard by the Underwriters' Laboratories.



You are cordially invited to the

Early Summer Showing of the New Preferred-Hart Junior

and other Preferred-Hart Automatic Oil Burners, to inspect the manufacturing and meet the personnel of the company at the factory.

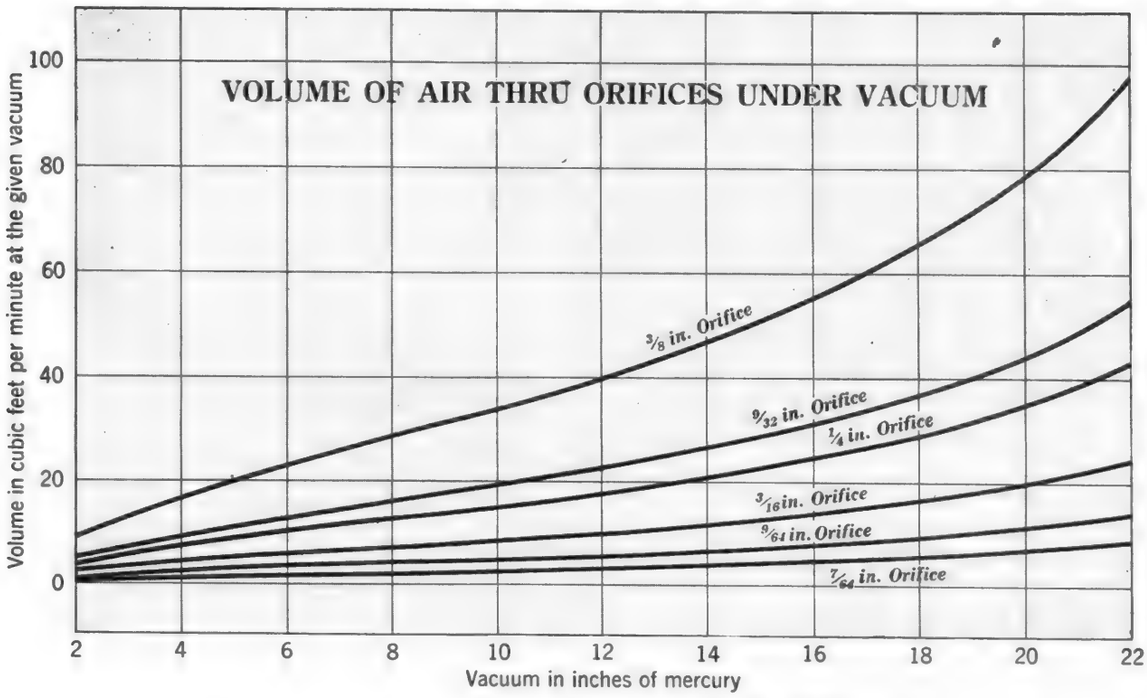
PREFERRED OIL BURNERS, INC., PEORIA, ILLINOIS

HART OIL HEAT COMPLETE LINE *Includes*

Preferred-Hart Junior (Green)—low first cost, fully automatic oil burner; built especially for small, hot air furnaces; needs no bricked-in combustion chamber. D-1 (Blue)—for small homes, D-2 (Gray)—for homes and semi-industrial jobs, D-3 (Red)—for semi-industrial installations, department stores and public buildings.

All four have Underwriters' approval; are fully automatic; burn all fuels; exceptionally profitable to sell because they install easily and need minimum servicing. All models have numerous exclusive features—available only on the Hart. Send for booklet "Simple Facts About Hart Oil Heat"—or come to Peoria and see for yourself.

PREFERRED OIL BURNERS, INC., PEORIA, ILLINOIS



Volume of air in cu. ft. per min. (at the vacuum referred to) flowing through orifices of specified size at different pressures

Jennings air capacity is quantitatively measured ~not guessed

WHEN you install a Jennings Vacuum Pump in a return line steam heating system, you can do so with confidence that the Jennings Pump can be depended on to remove the specified amount of condensation and air for which it is rated.

Take Jennings air capacity, for example. This is quantitatively determined for each pump before it leaves the factory, by means of the specified vacuum which the pump is able to maintain through a thin plate orifice, 1/8 in. thick, with sharp edges and aperture of given diameter.

NASH ENGINEERING CO.

81 WILSON ROAD SO. NORWALK, CONN.

Jennings Pumps

Trade and Miscellaneous Notes

Coming Events

June 12-15, 1928. Annual convention of the National District Heating Association at Atlantic City, N. J. Headquarters at Ambassador Hotel.

June 19-21, 1928. Forty-sixth annual convention of the National Association of Master Plumbers in Memphis, Tenn. Headquarters at the Peabody Hotel.

June 26-29, 1928. Semi-annual meeting of the American Society of Heating and Ventilating Engineers at West Baden, Ind. Headquarters at West Baden Springs Hotel.

June 26-29, 1928. Twenty-second annual convention of the Smoke Prevention Association at Rochester, N. Y. Headquarters at the Hotel Seneca.

August 20-September 3, 1928. Regional meeting of the American Society of Mechanical Engineers at the Twin Cities, and a tour of the Great Lakes.

September 17-20, 1928. Second national meeting of the Fuels Division of the American Society of Mechanical Engineers in Cleveland, O.

October 8-12, 1928. Tenth annual convention of the American Gas Association in Atlantic City, N. J.

October 15-19, 1928. Fifty-seventh annual meeting of the American Public Health Association in Chicago, Ill. Headquarters at the Hotel Stevens.

January 28-31, 1929. Annual meeting of the American Society of Heating and Ventilating Engineers in Chicago, Ill.

Miscellaneous Notes

April building operations, reported by the F. W. Dodge Corporation, have broken all previous monthly records, showing an increase of 9% over March of this year and 6% over April of last year. The figures for the 37 states east of the Rocky Mountains were $643,137,100. Analysis of the April building record shows that 43% of all construction was for residential buildings, 18% for public works and utilities, 13% for industrial projects, 13% for commercial buildings, and 5% for educational projects.

In New York State and northern New Jersey, contracts amounted to $150,905,900, being almost the same as that reported for March, but showing a decrease of 8% from last year's record. The New England States report contracts amounting to $46,420,600, this figure representing the highest April contract total on record for this district. It was 10% ahead of the March total, and a 9% increase over April, 1927.

The Middle Atlantic States report the highest month on record, contracts amounting to $102,584,200, being an increase of 47% over March and a 40% increase over April of last year. Two contracts which probably brought the total to such a figure were those of $10,000,000 and $17,500,000, respectively, for an electric power plant in southern New Jersey and for a group of manufacturing buildings. In the Pittsburgh district, amount of contracts was $75,005,600, 20% below March and 11% below April, 1927. Figures in the Central West show a record April, amounting to $187,232,000, representing a 7% increase over March and a 13% increase over April of last year. Contracts in the Northwest amounted to $7,138,200, showing an increase of 30% over last month's record and 23% decrease from April, 1927, total.

Construction amounting to $55,236,700 is reported for the Southeastern States, representing the second highest April contract total on record, also being 23% above the total for April of last year and 10% over the total for March of this

AUTOVENT VENTILATION

No. 1— IN LAUNDRIES

This is one of a series of advertisements showing the principal applications of Autovent Fans.

The illustration shows Autovent Fans installed in a large laundry, where proper ventilation is such an important factor in keeping up production.

Autovent Fans are supplied as a complete unit and are covered by a rigid guarantee. They can be relied upon to properly fulfil any duty for which we recommend them.

Our staff of engineers is always ready to advise you on all ventilating and heating problems—without obligation.

Autovent service includes the manufacture of Autovent Propeller Fans, "Uniblade" Blowers and Exhausters and Autovent Unit Heaters—a complete, well-built line.

REGISTERED AUTOVENT. TRADE MARK

SEE OUR CATALOGUE IN SWEETS

With the advent of improved methods of operation in laundries it has become absolutely necessary to provide proper ventilation. Autovent Propeller Fans are highly effective in eliminating heat, steam and condensation in laundries, dry cleaning plants, paper mills and in any place where similar air conditions are found.

The Great Western Laundry Co., Chicago, one of the largest in the country, uses nineteen Autovent Fans in the various departments of its three-story plant.

Autovent Fans assure ideal working conditions, and in the increasing demand offers convincing evidence of the correctness of materials and engineering principles employed. Before specifying your next fans, investigate Autovent Products.

Autovent Fan & Blower Co., 1805-1827 No. Kostner Ave. CHICAGO, ILL.

year. In Texas contracts amounted to $18,613,900, showing a decrease of 6% from March and 10% decrease from April of last year.

Eastern Trade Golf Association held its annual meeting and luncheon at the Building Trades Club, 2 Park Ave., New York, April 11, with 50 members present. President Thomas J. O'Donnell read his annual report, and Secretary R. G. Bookhout, in his report, showed a substantial cash balance in the treasury. These officers were elected: President, T. M. Kellogg; vice-president, John K. Law; secretary-treasurer, R. G. Bookhout. Board of governors: R. H. Carpenter, J. J. Doherty, C. A. Miller, R. E. Peck and C. G. Witherspoon. A tournament committee was appointed by the president of the following: T. M. Cochran, A. Engle, Harold Townsend and Thomas Doherty. An amendment to the by-laws was made, changing the annual meeting from the second Wednesday in April to the first Wednesday in February. The first meeting of the season was held at the Winged Foot Country Club, Mamaroneck, N. Y., May 16.

National Association of Plumbing and Heating Salesmen held its third annual convention in Pittsburgh, Pa., May 31-June 2. A program of constructive work was carried out in addition to entertainment of members and guests, including a tour of the city of Pittsburgh.

Cleveland Chapter No. 12, of the Association of Plumbing and Heating Salesmen, held its second annual dinner dance at the High-Noon Club, Cleveland, April 21, with 118 members and guests in attendance. President Charles Smith, sales manager of the Kennedy Company, acted as master of ceremonies. Al Saas, of the Walworth Company, was chairman of the entertainment committee.

Greater Detroit Chapter No. 3, National Association of Plumbing and Heating Salesmen, held its regular monthly meeting at the Cadillac Athletic Club, Detroit, May 3, with Joseph Stewart, vice-president, presiding. George Larkin, J. B. Sullivan and T. P. West were elected as delegates to the National Convention at Pittsburgh, May 31. Alternates chosen were: Ray Penhallegon and Glen H. Waid.

J. B. Bernhard, 1303 Park St., McKeesport, Pa., has sold his entire interest in the Bernhard Boiler Company to the Columbia Radiator Company, of McKeesport, Pa.

Tri-City Plumbing and Heating Trade Development League, members of which include master plumbers and heating contractors, and steam fitters, of Rock Island and Moline, Ill., and Davenport, Iowa, was organized at the Fort Armstrong Hotel, Rock Island, May 2, with 110 in attendance. Officers of the league for the ensuing year are: President, F. R. Ervin, N. O. Nelson Mfg. Company; first vice-president, John Heinkel, Blake Specialty Company; second vice-president, W. L. Stange; secretary, Kirk A. Journy; treasurer, Harry Repine.

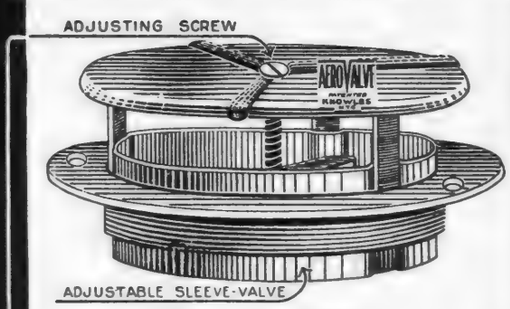
Associated General Contractors met at the Hotel Cleveland, Cleveland, O., April 2, in an effort to solve some of the difficulties that have been disturbing the building interests, especially those causing friction between general contractors and the sub-contractor.

George B. Walbridge, chairman, stated that the object of the meeting was: To discuss conditions and practices in the construction industry, which are unsatisfactory to both the general and sub-contractor; to ascertain what means of correction could be formulated, and to inaugurate co-operation and joint action, for the purpose of establishing fair practices, correcting unsatisfactory conditions and bringing the two groups into a more satisfactory and harmonious relationship.

The Heating and Piping Contractors National Association was represented by Walter Klie, of Cleveland, chairman of the board of directors.

Mr. Klie mentioned the fact that general contractors often invite irresponsible sub-contractors to bid, and stated that, in his opinion, architects were more careful in that respect than general contractors. Also that one of the principal reasons why heating and piping contractors favored separate contracts was that they enabled the heating and piping contractor to sell his service on a basis other than price, whereas with a general contractor the "price only" policy usually prevailed, with less thought of quality.

Knowles AERO VALVE



Patented—No. 1380567

A simple turn of the screw gives the finest possible regulation

The IMPROVED Mushroom Air Diffuser

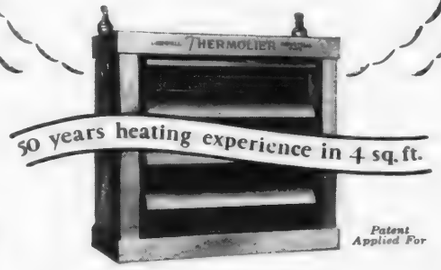
Easier to Regulate
Cheaper to Install
and Priced Right

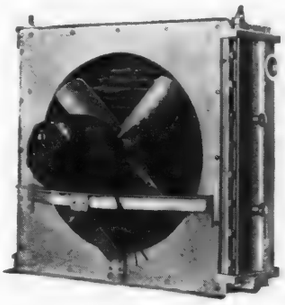
An up-to-date mechanically correct Air Unit of fixed height; made of heavy rolled steel. Adapted to fulfill every requirement of Architect, Engineer and Contractor.
It combines the maximum of efficiency with the utmost convenience of adjustment by means of a hollow cylindrical sleeve-valve, which moves easily up and down in the air space by simply turning adjusting screw on top of cap. It affords the finest control of air delivery properly deflected from dome shaped cap and is free from obstructions and air pockets when used as an exhaust unit. Installation is simple and economical.
Provided with sleeve as a complete unit ready to install, or separately, with or without protecting steel sleeve ring. (See booklet for detail data.)

Knowles Mushroom Ventilator Co.
202 Franklin St., New York City

MADE BY THE MAKERS OF THE FAMOUS "NU-NOTCH" MUSHROOM AND "DISC-LOC" GALLERY RISER VENT

What makes GRINNELL THERMOLIER A *BETTER* UNIT HEATER



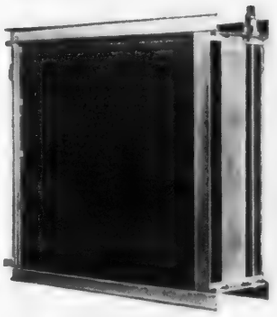


Fully enclosed, over-size, ball-bearing motor and aluminum fan.

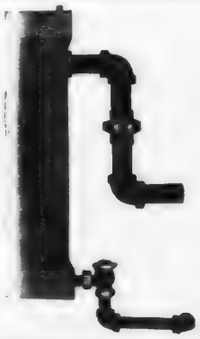
A WORLD of sound practical experience built into the new Grinnell Thermolier makes it a rugged and efficient unit for industrial heating.

Even a hasty examination of the points of superiority here illustrated will convince any engineer that the Thermolier is worthy of closer study.

Our interesting booklet describing this unit gives complete details. It is invaluable to those interested in industrial heating problems. A copy is yours for the asking. Address your inquiry to Grinnell Co., Inc., 208 W. Exchange Street, Providence, R. I.

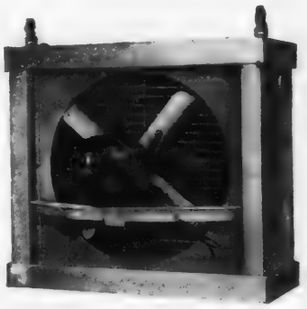


Heavy frame with ⅝ inch through-bolt hangers.

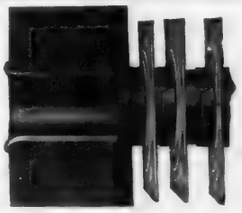


Simple piping connections, both on same side, with close return trap.

Unique header construction forces all condensation through integral cooling leg.

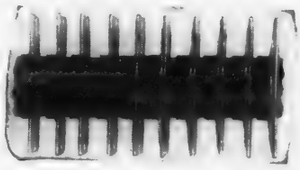


Copper housing makes for durability and fine appearance.

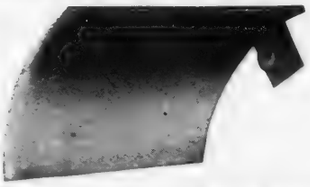


Tubes expanded into cast-iron header.

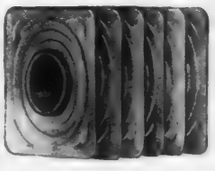
Perfect expansion bends take up all strains.



No flat horizontal surfaces to catch dirt.

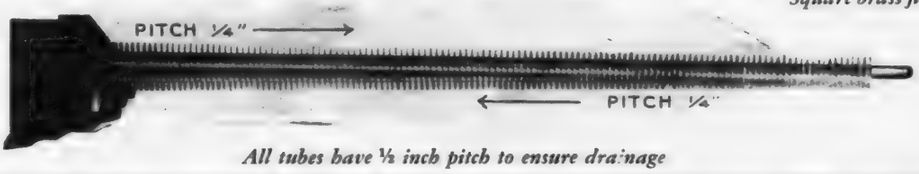


Independently adjustable copper louvers.



⅜ inch seamless copper tubing. Square brass fins.

Easily adjustable swivel socket hangers.



All tubes have ½ inch pitch to ensure drainage

GRINNELL COMPANY

Executive Offices: Providence, R. I. *Branches in all Principal Cities*

The Public Ledger, Philadelphia, Pa., recently entertained 100 prominent steam fitters from the Philadelphia territory. The principal speakers were E. L. Flentje, campaign manager of the Plumbing and Heating Developing League, who gave an outline of the league and the advantages of the master steam-fitter cooperating with it; B. H. Gordon, national advertising manager of the *Ledger*, whose subject was "Merchandising the Advertising," explained how the distributor profited most when he coordinated with the advertising done by the manufacturer, and W. R. Stockwell, general manager of the Weil-McLain Co., Chicago, who spoke on the technical subject of boilers.

Michigan Trade Golf Association held its annual meeting and election of officers at the Detroit Golf Club, April 10. W. B. Johnson acting as host for the evening. New officers are: President, L. L. McConachie, McConachie & Reid; vice-president, Earl Sheeley, Glanz & Killian Company; secretary, J. B. Stewart, Republic Brass Company; treasurer, E. S. Donahue, American Radiator Company. Board of governors: E. M. Decker, American Radiator Company; J. W. Simmons, Standard Sanitary Mfg. Company, and W. B. Johnson, Ideal Furnace Company.

U. B. Groves, formerly advertising manager of American Nokol Co., Chicago, is conducting an advertising writing and counselling business with offices at 225 North Michigan Ave., Chicago.

Changes of Address

Simplex Mfg. Co., Chicago, is occupying its new factory at 2644 North Ashland Avenue.

Reading Iron Co., Reading, Pa., has moved its Chicago office from 429 Conway Bldg., to 1714 Engineering Building, 205 West Wacker Drive.

Thermal Radiator Corp., Chicago, formerly located in the Marquette Bldg., has moved its offices to the Adams and Franklin Bldg., 222 West Adams Street.

Manufacturers' Notes

American Radiator Co., New York, has established a sales office and showroom at 311 Brady St., Davenport, Iowa., with H. A. Voss in charge. Mr. Voss formerly was assistant manager of the Chicago branch. Other new showrooms will be opened at 222 South Jefferson St., Peoria, Ill., and at 824 Locust St., Des Moines, Iowa.

Ames Pump Co., Inc., Division of Staten Island Shipbuilding Co., 90 West St., New York, has appointed the following exclusive sales representatives: Dravo-Doyle Co., 1505 Race St., Philadelphia, and 300 Penn Ave., Pittsburgh; Simonds Mfg. Co., 816 Folsom St., San Francisco, and 520 East 4th St., Los Angeles, Calif.; Coon-DeVisser Co., 2051 West Lafayette Blvd., Detroit, Mich.; W. E. Berrington, 707 Canal Road, N. W., Cleveland, O., the Pump & Equipment Co., Inc., 16 Water St., Norwich, Conn., and 945 Main St., Bridgeport, Conn., and Yeomans Brothers Co., Chicago.

Grant Home Heater Corp., 2 Rector St., New York, has been organized by A. E. Grant, designer of the Gulf oil burner, and formerly president of the Grant Accessories Corporation, which concern has been merged with the new corporation. The company will sell the Grant heat machine which is a new low-priced burner for domestic use. Officers are: President, A. E. Grant; vice-president and managing director, C. W. Stockton; secretary and treasurer, Branch P. Kerfoot; director, W. S. Hull.

Winslow Boiler and Engineering Co., Chicago, announces the resignation of L. S. McDonough as general sales manager; T. C. Kyle has been appointed to succeed Mr. McDonough. Hereafter B. K. Eaton will devote his entire time to the Chicago office.

The Foxboro Co., Foxboro, Mass., has established a branch office at 2104 Magnolia Bldg., Dallas, Tex., with J. B. McMahon as district manager. Mr. McMahon will have associated with him R. L. Mallory and C. L. Bryan. The Dallas territory includes the states of Texas and Louisiana and the southern sections of New Mexico and Arkansas.

Williams Oil-O-Matic Heating Corp., Bloomington, Ill., has appointed J. A. Worsham as a sectional sales manager in charge of the territory including Ohio, Pennsylvania, Maryland, Virginia, West Virginia, New Jersey, Delaware

TENTACULAR

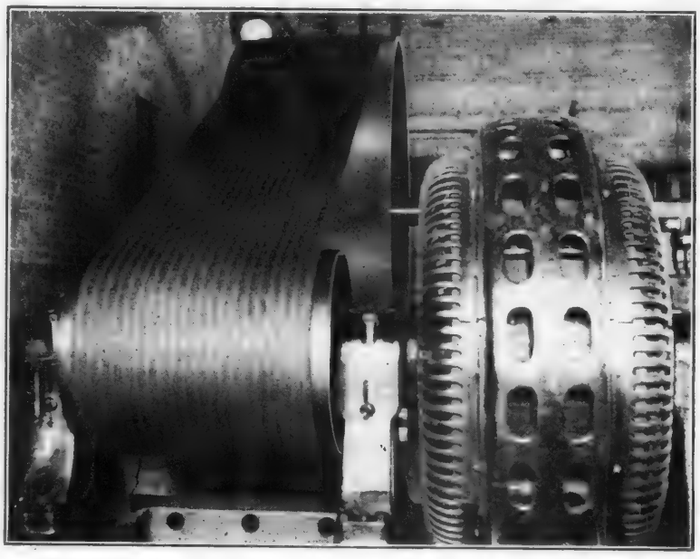
Higher Efficiency on Power Transmission

Here's a "TENTACULAR" Belt Transmitting 350 H.P.

to a big fan at one of the largest coal mines in the State of Penna.

"Tentacular" meets all requirements in heating and ventilating work. There is no limit to the speed at which they can be run. Efficiency remains constant at all speeds. Special construction reduces slippage. No special equipment or pulleys are required. Considerable space can be saved because Tentacular will operate on very short pulley centers where pulley ratio is unusually high. Quiet in operation—an important feature in connection with ventilating work.

requires no idler.
is easy on bearings.
runs efficiently on very close centers with low tension.
is noiseless in operation.
needs no special pulley—just the usual flat face.



Let our Engineering Department help you. Send for catalog.

ALEXANDER PHILADELPHIA

Alexander Brothers, Inc., 19 South Street, PHILADELPHIA, PA.

Sole Makers of Tentacular Transmission Belting

Branches and Distributors in All Principal Cities.

Undisturbed quiet . . .

no operating sound comes from the "Silent" Sturtevant

TURN the control of the "Silent" Sturtevant Unit Ventilator to the starting position. Immediately, within the attractive metal cabinet a powerful fan and motor begin their work. But so smoothly and quietly do they run that you cannot hear the slightest operating sound.

Many months of designing and experimenting are behind this Sturtevant Equipment. All of this company's research facilities were enlisted to solve the problems its development presented. Fans and motors, specially designed for silent operation, were evolved.

There are many more pertinent facts in our Catalog No. 344-A. You will be sure to find them of interest. The nearest office below would welcome your request for a copy.

B. F. STURTEVANT COMPANY, HYDE PARK, BOSTON, MASS.

Atlanta	Camden	Cleveland	Detroit	Kansas City	Minneapolis	Rochester
Birmingham	Charlotte	Dallas	Hartford	Los Angeles	New York	St. Louis
Boston	Chicago	Denver	Indianapolis	Washington, D. C	Pittsburgh	San Francisco
Buffalo	Cincinnati				Portland	Seattle

Canadian Offices at: Toronto, Montreal and Galt, Ont. Also Agents in Principal Foreign Countries.

Sturtevant REG. U.S. PAT. OFF. *the Silent Unit Ventilator*

and Eastern Canada. Mr. Worsham was formerly secretary, treasurer and general manager of the Maroa Mfg. Co., Maroa, Ill.

Afco Products Co., New Haven, Conn., manufacturer of a scale and rust remover and preventive, has moved its main office from New Haven to 11 West 42nd St., New York. Associated in this office with Charles Q. Sherman, president, will be Harry L. Payne, in charge of the industrial division of the company, which includes work with industrial boilers, household heating plants and plumbing systems where the formation of scale and rust becomes a detriment.

Petroleum Heat and Power Co., 511 Fifth Ave., New York, announces the following appointments of new dealers: L. E. Hollander, 148 Hillside Ave., Jamaica, L. I.; Hewitt & Bavier, New Rochelle, N. Y.; Percival & Clifton, Port Washington, N. Y., and B. E. Sherman & Sons, West Englewood, N. J. The Herbert E. Williams, Jr., Company distributors of the Petro line of burners in the metropolitan New York district, will direct the work of these dealers. Outside of the New York area the following dealers have been appointed by the Petro organization: Meadows Heating Co., Milwaukee, Wis., N. W. Howell Co., Wilmington, Del., and C. C. Carper, Norfolk, Va., which latter organization will be southwestern distributor for the Petro burner.

Sarco Co., New York, has appointed M. H. Landon as sales engineer to cover the metropolitan territory.

Wagner Electric Corp., St. Louis, Mo., announces that E. D. Pike has been appointed manager of the San Francisco branch sales office. Mr. Pike was in charge of the Pacific Coast service department and the promotion comes after 26 years of service with the company.

Kennedy Valve Mfg. Co., Elmira, New York, announces the election of officers as follows: President and treasurer, Matthew E. Kennedy; vice-president and secretary, J. Carroll Kennedy; vice-president and general sales manager, Clarence H. Kennedy. These officials are sons of the late Daniel Kennedy who founded the business over fifty years ago and who was president until his death last January.

E. W. Carr, Inc., New Orleans, La., contractors and sales engineers, has been appointed district representative and distributor for McDonnell & Miller duplex water feeders, Johansen boilers, and Peerless gas boilers.

Kellogg-Mackay Co., Chicago, announces the appointment of R. E. Bidwell, formerly vice-president and general manager of the Kansas City branch, as general sales manager with headquarters at the main office, 1351 West 37th Place, Chicago. Mr. Bidwell has been associated with the company for more than 29 years. William J. Hebenstreet, who has been in charge of the plumbing department at the Kansas City branch, will manage that office and will be assisted by R. C. Huber, who has served in a sales capacity in the Kansas City territory.

American Radiator Co., New York, has opened its showroom on the ground floor of the Hotel Peabody, Memphis, Tenn. J. L. Emery, for more than 10 years resident representative in Memphis, will have charge of the local branch office.

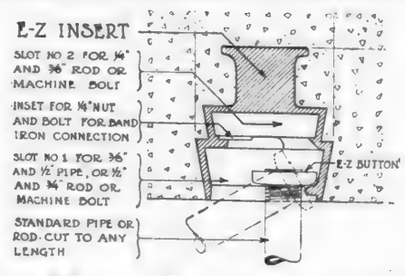
American Gas Products Corp., 376 Lafayette St., New York, distributor of Ideal gas boilers, announces that Brewster S. Beach, sales and advertising manager, has resigned.

Southland Supply Co., Inc., Dallas, Tex., has been incorporated for $125,000 and will handle heating, plumbing and mill supplies. In February the company purchased the Fisher Supply Company, and the building, included in the purchase, has 71,000 sq. ft. of floor space. J. J. Fryar, former vice-president of the Wallace Plumbing Company, is president of the Southland company; B. V. Henegar, formerly manager of the Wolff Mfg. Co., is vice-president, and Horace Thames, formerly with the Fisher Supply Company, is secretary.

Union Gas & Electric Company and associated companies of the Columbia Gas & Electric Corporation has appointed F. S. Dewey as general sales manager in the Cincinnati district, to supervise the sales of gas, electricity and gas and electrical appliances. Mr.

E SIX IN ONE Z

CONCRETE INSERTS


E-Z INSERT
SLOT NO 2 FOR ¼" AND ⅜" ROD OR MACHINE BOLT
INSET FOR ⅜" NUT AND BOLT FOR BAND IRON CONNECTION
SLOT NO 1 FOR ⅜" AND ½" PIPE, OR ½" AND ¾" ROD OR MACHINE BOLT
STANDARD PIPE OR ROD CUT TO ANY LENGTH
E-Z BUTTON

A New Convenience!

Only one size needed for all pipe hangers. Ball and socket connection between insert and hanger. Fully adjustable — allows play to overcome expansion and inaccurate alignment of inserts. *E-Z Button turns in the insert—no couplings or turnbuckles needed.*

Write for Details and Prices

Healy-Ruff Co.
772 Hampden Ave., St. Paul, Minn.
Manufacturers of E-Z Radiator Hangers

TURTLEBACK
TRADE MARK

Quickly Recognized

According to the rapidity with which architects and engineers are becoming backers of the Turtleback Air Diffuser, it certainly does not take long for them to recognize their ability to properly and uniformly diffuse the air.

"Turtlebacks" are highly advantageous for the fan system used in theatres, schools and auditoriums, where close regulation and free air flow are demanded.

Easily installed, simply adjusted, and rigid when locked in place by center set screw.

Write for illustrated catalog

VENTILATING PRODUCTS CO.
2800 Cottage Grove Ave., Chicago, Ill.

Better heating at less cost—clean, easily installed, flexible

When the Unit Heater is compared with other types of heating equipment, the enormous advantages of the former are evident. Lower first cost, lower installation cost, lower operating cost, better efficiency, much more flexibility, cleaner,—all these plus positive circulation of warmed air—these are some of the characteristics of Buffalo Breezo Fin Unit Heaters. Sturdy, compact construction and an unusually efficient fan unit are other features which add to their popularity.

"Heat with Unit Heaters"

Write for this new Booklet—
"Industrial Heating"

We now have a new book at the printer's which covers this subject in an interesting manner, explaining the advantages of various types and giving information as to the proper location of units.

Write for your copy Today.

Buffalo Forge Company

480 Broadway, Buffalo, N. Y.

In Canada—Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

1878 "Buffalo" 1928 — **"Air Engineers for Fifty Years"**

Dewey formerly was vice-president of the Kansas City Power & Light Company and was in general charge of that company's new business activities.

Armstrong Mfg. Co., Bridgeport, Conn., announces that the management of the company has been taken over by another branch of the Armstrong family. Frederick S. Ashmun, now secretary and treasurer, is a grandson of Frank Armstrong, founder of the business. The new president, B. I. Ashmun, father of Frederick S. Ashmun, has been associated with the company for the past 35 years. Leslie H. Taylor has been placed in charge of sales for the middle west, with headquarters at 9 South Clinton St., Chicago. Mr. Taylor formerly was sales manager of the Williams Pipe Threading Machine Co. of Erie, Pa. On May 1, the New York sales and general export office of the company was moved from 181 Lafayette Street to 27 Cleveland Place, at Spring and Lafayette Streets.

National Flue Cleaner Co., Inc., Groveville, N. J., manufacturer of soot blowers for return tubular and Scotch marine boilers, has appointed the following as district representatives: Jack Deerwester Co., 1621 University Ave., St. Paul, Minn.; Charles Zinram, P. O. Box 487, Erie, Pa.; Laib Co., Louisville, Ky., and the Walter G. Heacock Co., at 30 Euclid Arcade, Cleveland, O., and at 413 Penobscot Bldg., Detroit, Mich.

Erie City Iron Works, Erie, Pa., has established a direct sales office at 1105 Leader Bldg., Cleveland, with Eugene Smith as district manager.

Mercoid Corp., Chicago, announces that J. N. Derby, Jr., now is at the San Francisco office; B. F. Wert, formerly of the Underwriters' Laboratories, is sales engineer at the Chicago office; H. A. Mathews is associated with the sales department and will operate in the Michigan, Indiana, Kentucky and Illinois territory.

New York Blower Co., Chicago, Ill., has established the following offices: 418 Rockefeller Bldg., Cleveland, O., with George A. Mathis in charge; 5614 Eighth St., N. W., Washington, D. C., W. L. Ticer in charge; 620 American Bank Bldg., Los Angeles, Calif., with William van den Heuvel in charge.

Bayley Blower Co., Milwaukee, Wis., announces the promotion of Charles H. Jackson from the position of chief engineer to that of general sales engineer. Ernest Szekely, formerly chief engineer of Drying Systems, Inc., and recently a consulting engineer in Cleveland, has been appointed to succeed Mr. Jackson.

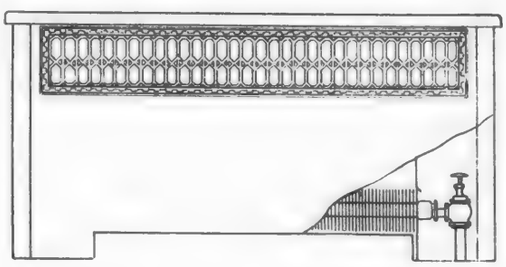
Peerless Unit Ventilation Co., Bridgeport, Conn., announces that the improved PeerVent heating and ventilating unit now is in mass production. The improvements include a new radiator, alternating-current motor, PeerVent fan housings, and simplified dampers. Three types of Peer Vent units, now standardized, can be furnished to meet any requirement.

American Nokol Co., 215 North Michigan Ave., Chicago, Ill., has changed its name to America Nokol Corporation, and also has moved to 4217 Schubert Avenue.

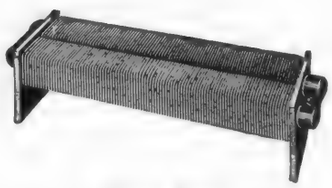
Linde Air Products Co., New York, opened a new district sales office at 48 West McLemore Ave., Memphis, Tenn., to take care of territory which consists of western Tennessee, northern Mississippi and eastern Arkansas. H. N. Smith is district manager in charge.

Vessey-Hackett Sales Co., 2401 Chestnut St., Philadelphia, Pa., has been organized by Charles P. Hackett and Robert Vessey. Mr. Hackett for 15 years was manager of the Philadelphia territory for the United States Radiator Corporation. Mr. Vessey was vice-president of the Oberndorf Corp., Cleveland, until the merger inaugurating the United Oberndorf Corporation, then representing that company for the past few years. The new concern will cover the Middle Atlantic states for the Commonwealth Brass Corp., Detroit; Kelly Brass Works, Chicago; Gas & Electric Heater Co., LaPorte, Ind.; Century Brass Works, Belleville, Ill., and the Keeney Mfg. Co., Newington, Conn.

Davis Engineering Corp., 90 West St., New York, has appointed the Maher Equipment Co., 333 North Michigan Ave., Chicago, as exclusive sales representatives in that territory for heat exchanges, storage-water heaters, instantaneous water heaters, steam traps, etc., sold under the trade name of "Paracoil."



Convecto Cabinet and Heat Unit



Heat Unit
Light in weight—Compact

Convecto Radiators and Cabinets

For the modern home, apartment and public building, where the radiators are to be concealed in the wall or exposed to view in artistic cabinets, Convecto Radiators are made to meet the requirements of the most exacting architect and engineer.

Convecto Radiators are all copper or combinations of copper, brass and steel, and manufactured under a patented expanding process—the only extended surface radiator of its kind made. They are rugged in construction and will give lifetime service.

Convecto Cabinets are capable of finish and artistic appearance to meet the requirements of people of refinement and taste.

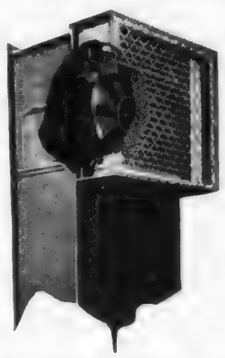
Complete Information in new catalog just issued.

METAL STAMPING CO.
Long Island City New York, N. Y.

HOT CEILING AREAS AND COLD FLOORS don't belong in industry

HEAT WITH UNIT HEATERS

VENTURAFIN
TRADE MARK
METHOD OF UNIT HEATING



Venturafin consists of the following major parts: (1) copper fin heater—with 5 times the radiating efficiency of ordinary iron coils; (2) the famous American Blower Ventura fan (which forces the heated air out); and (3) air recirculating box.

VENTURAFIN units heat the air like any other heating system—by means of steam or hot water coils. If left alone, this heated air would rise and "pack" at the ceiling. But it isn't left alone. The Venturafin Method forces the heated air out into working areas and draws the cooler air from floor areas up into the recirculating box, whence it is heated and forced back into circulation. Thus Venturafin gives more even distribution of heat—enables you to heat up more quickly—directs heat where you want it and as much as you want. Venturafin Units occupy considerably less space and are much lighter in weight than ordinary heating equipment. They are made in sizes delivering from 450 to 8000 cubic feet of heated air per minute, and are particularly adaptable for heating stores, factories, warehouses, garages and shops.

For Heating and Ventilating Engineers

The American Blower Corporation will gladly furnish you with any data you may desire that will aid you in figuring or selling the Venturafin Method of Heating.

AMERICAN BLOWER CORPORATION, DETROIT, MICHIGAN
CANADIAN SIROCCO COMPANY, LIMITED, WINDSOR, ONT.
BRANCH OFFICES IN ALL PRINCIPAL CITIES

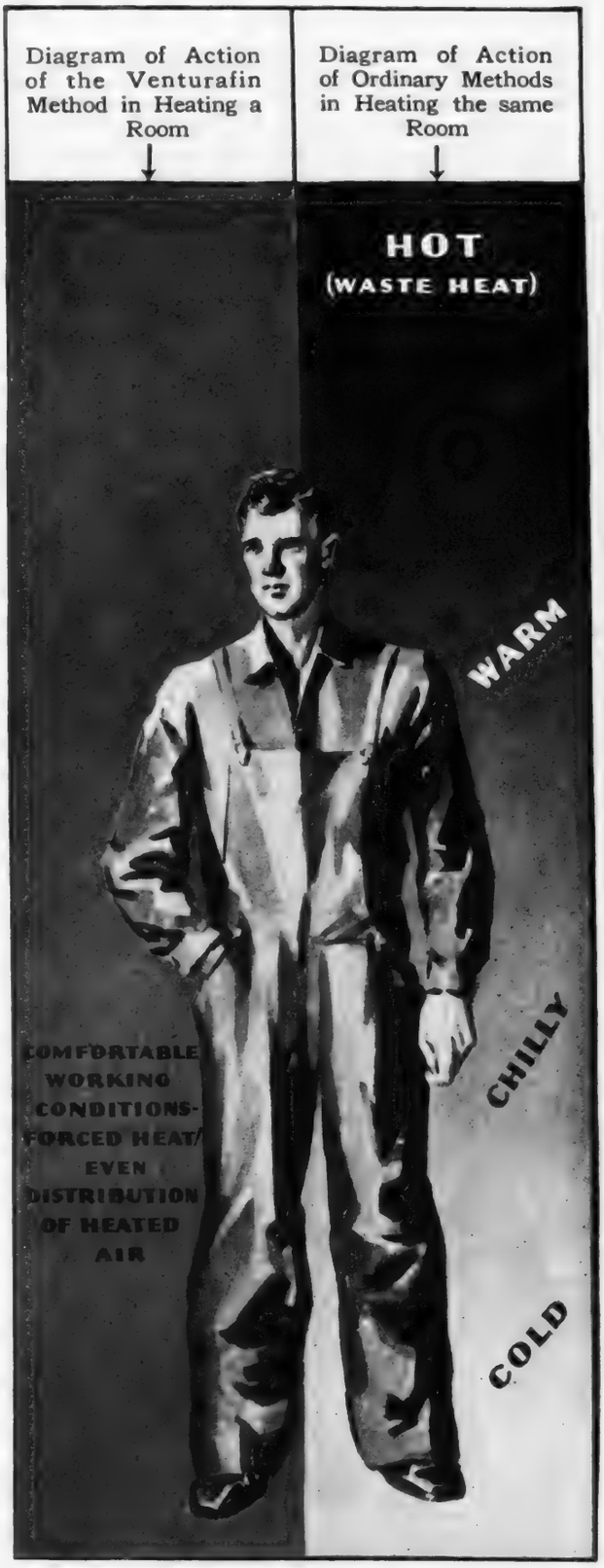


Diagram of Action of the Venturafin Method in Heating a Room
Diagram of Action of Ordinary Methods in Heating the same Room
HOT
(WASTE HEAT)
WARM
CHILLY
COLD
COMFORTABLE WORKING CONDITIONS-FORCED HEAT/ EVEN DISTRIBUTION OF HEATED AIR

(762)

American Blower

"Sirocco" TRADE MARK

VENTILATING, HEATING, AIR CONDITIONING, DRYING, MECHANICAL DRAFT

MANUFACTURERS OF ALL TYPES OF AIR HANDLING EQUIPMENT SINCE 1881

Lincoln Radiator Corp., Utica, N. Y., will move its plant and machinery to North Tonawanda, N. Y., about August 1. This business is controlled by the National Radiator Corporation and the International Heater Company, and although the local plant has been solely devoted to the manufacture of radiators, an expansion of products is expected at the new location.

Chicago Pump Co., 2336 Wolfram St., Chicago, Ill., has broken ground for a second addition to its factory. The original plant, containing 21,000 sq. ft., was built in 1920; in 1925, 14,000 sq. ft. were added, and the new structure will add 15,000 sq. ft., also being designed to accommodate overhead cranes.

Henry C. Nieberg, formerly of the Jamaica Plumbing & Heating Supply Company, Queens Village, L. I., which recently was liquidated, has opened a heating and plumbing supply house at 1961 Flatbush Ave., Brooklyn, N. Y.

Russell D. Knight Co., Philadelphia, Pa., announces that Clifford R. Knight, son of the head of the company, has become associated with it and will sell heating and plumbing supplies.

American Radiator Co., New York, has appointed Wallace M. Cosgrove district vice-president of the company. Mr. Cosgrove has long been connected with the radiator business, and has served as manager of the New York offices of the American Radiator Company for 20 years.

Classified Advertising

Advertisements under this heading, $2.00 per inch, payable in advance. A 1-in. advertisement contains 35 words. To secure insertion copy must be received not later than the 20th of the month preceding date of issue.

SALES REPRESENTATIVES WANTED—Old established company, manufacturing high-grade vapor heating specialties, has some territories open, particularly in the West and South. This is the easiest system to sell as it is the only true single-pipe vapor system with consequent saving in installation cost. Commission basis. Lay-outs not necessary. State territory and other lines handled. All communications held strictly confidential. Address Box 61, care of Heating and Ventilating Magazine.

MANUFACTURER'S REPRESENTATIVE—Manufacturer of complete line of fans, air washers and unit heaters, desires recognized representatives on commission basis. Address Box 62, care of Heating and Ventilating Magazine.

MANUFACTURER'S AGENCY WANTED—Manufacturer of steam saving equipment and patented allied specialties, located in the East, requires agents in Virginia, North and South Carolina, and Central and Eastern Pennsylvania. This is a strictly commission project with exclusive sales rights for a qualified representative who maintains own office in each territory. Replies will be held confidential. Address Box 63, care of Heating and Ventilating Magazine.

FOR SALE—Patents for return and non-return tilting traps, and other specialties in the United States. Address Farrfhern, 210 Galley Ave., Toronto, 3, Canada.

CLIMB UPWARD TO SUCCESS THROUGH TECHNICAL TRAINING

There is always room at the top for the technically trained man. For over 18 years, St. Louis Technical Institute has especially trained men for deserved promotion. An army of men have gained steady employment, higher salaries and more of the better things of life through our courses. You, too, achieve success through our engineering courses. Check the subject interested in, and send for full free information; no obligation.

- ☐ Heating and Ventilating Engineering.
- ☐ Special Steam and Water Heating.
- ☐ Scientific Warm Air Heating.
- ☐ Plumbing and Sanitary Engineering.
- ☐ Contracting and Estimating.
- ☐ Mechanical Drafting.

Saint Louis Technical Institute.

Est. 1910

The most thorough institution for Technical Home Study to-day.

4543 Clayton Avenue St. Louis, Mo.

New DeBothezat Bifurcator

For special ventilating jobs where fumes of excessive temperature or corrosive character are to be removed.

The bifurcator is a device that permits the **use of a straightway duct. A short shaft** connects the fan to the motor, which is located in a transverse opening through the duct. This fan chamber is **streamlined** in section, and the **bifurcated duct is not reduced in area** at this point.

Full Details on Request

DEBOTHEZAT IMPELLER CO., Inc. 1922 Park Avenue New York City

The cause for the wide use of ME Fans in America's better buildings: Quiet and continuous performance . . . . Durability—Economy—Guaranteed Ratings.

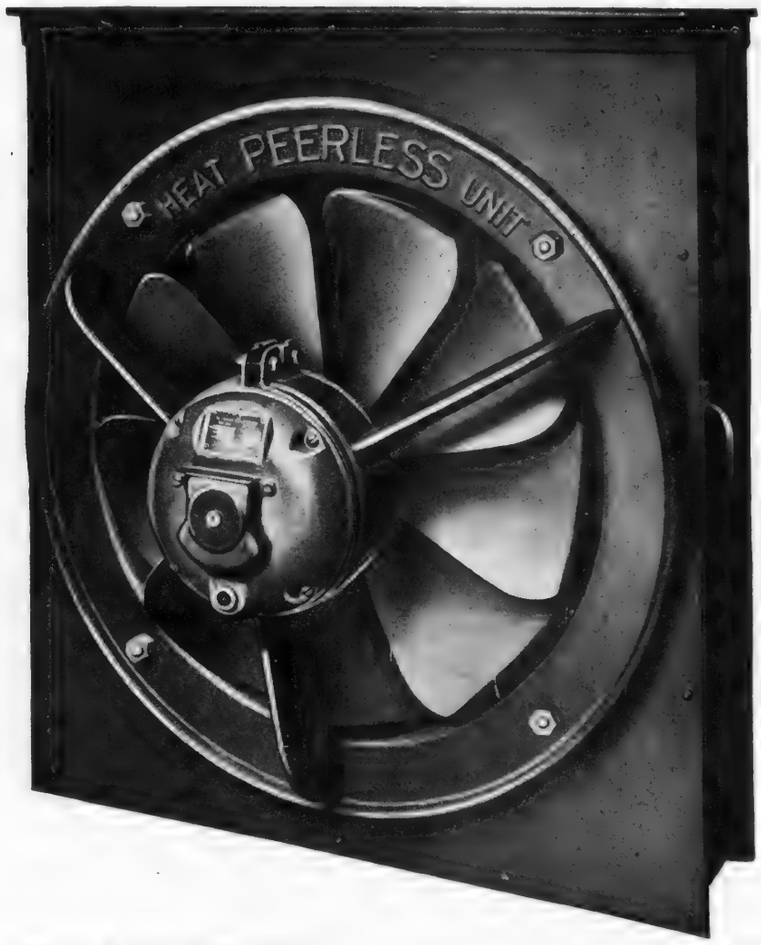
Write for bulletin No. 100

NEW YORK BLOWER COMPANY

2242 South Halsted Street

Chicago, Illinois

Representatives in principal cities



Are you handling your share of this Unit Heater business

THE ADVANTAGES of unit heaters for industrial buildings have received an unprecedented volume of publicity. Trade paper write-ups, editorials, and advertisements, as well as discussions at gatherings of architects, contractors, and engineers, have all combined to make this one of the livest topics of the day. As a result, more and more industrial buildings are being equipped with the modern Unit System, which costs less and provides better heating service.

Are you getting your share of this business?

If you are thinking along this line, the booklet pictured at the left will be helpful. Send for it. Bear in mind that Peerless Units are made in the same shop which produce the well-known PeerVent System of Heating and Ventilating, used in school buildings throughout the country.

PEERLESS UNIT VENTILATION CO., Inc.

718-34 Crescent Ave. :: :: :: BRIDGEPORT, CONN.

NEW YORK, 369 Lexington Ave.; BOSTON, 80 Boylston St.; BUFFALO, 135 University Ave.; HARRISBURG, 705 Telegraph Bldg.; CLEVELAND, 1836 Euclid Ave.; DETROIT, 1214 Lafayette Bldg.; CHICAGO, 808 Monadnock Bldg.; MINNEAPOLIS, 240 Seventh Ave. So.; PORTLAND, ORE., 927 Board of Trade Bldg.; TORONTO, CANADA, Darling Bros., Ltd., 77 York St.

Mail this! with your letterhead, please

To Peerless Unit Ventilation Co., Inc.,
718-34 Crescent Ave.,
Bridgeport, Conn.

☐ Send booklet about Unit Heaters.

☐ Send your local representative.

H

PEERLESS

UNIT HEATER

Because of two outstanding factors, Skinner Engineers can show you (probably better than anyone else) how to

Save real money on your heating plant

Skinner Brothers' St. Louis Plant (Eastern Factory at Elizabeth, N. J.)

COMBINING a *34-year accumulation of heating experiences* with the *proved* effectiveness of the Skinner (Baetz Patent) Air Heater, Skinner Engineers are able to give you

"Work-Area" Heating at Lowest Cost

In practically every instance, whether called in first or after everybody else, they have been able to show where a substantial saving could be made.

Skinner men are not salesmen but Heating Engineers. Originating the Unit Method of heating, and adapting it to thousands of industrial plants, they have developed the Skinner Air Heater as the ideal source of warmth for the "Work-Area".

The Skinner Air Heater provides a steady, easily controlled supply of warmed air and diffuses it evenly throughout the entire space where your producers are working. It is designed to hold the heat down—not waste it warming unused space overhead. Special Skinner-designed multivane fans draw air into the heater from the floor line, pass it through a nest of steam pipes and discharge it just above the heads of the workers. As the air which is pulled away from the floor level must be replaced, the warm blanket of air above is drawn right down into the "Work-Area". Each employe is comfortably warm—none chilled—none overheated.

Suppose You Just Roughly Sum Up the Savings

that have come to innumerable industrial firms through Skinner service—the advantage of Skinner *engineering, saving perhaps thousands of dollars on heating equipment*—the *saving in fuel bills* which Skinner Engineers achieve by the scientific arrangement of the heating units—the *increased productivity of your employes* because of the more comfortable working condition. Then call in Skinner Engineeers and let them prove that they can bring *you* similar savings.

See phone book for branches in:

Cleveland	**Washington**
Buffalo	**Kansas City**
Detroit	**Pittsburgh**
Seattle	**Baltimore**
Chicago	**Philadelphia**
Boston	**Indianapolis**

Factories at St. Louis and Elizabeth, N. J.

MAIL COUPON TODAY

Skinner Bros. Mfg. Co., Inc.,
1450-90 S. Vandeventer
St. Louis, Mo.

I am interested in:

- ☐ Heaters
- ☐ Ventilators
- ☐ Dryers
- ☐ Dust Collectors
- ☐ Light Weight Heaters
- ☐ Direct Fired Heaters

Name _____

Address _____

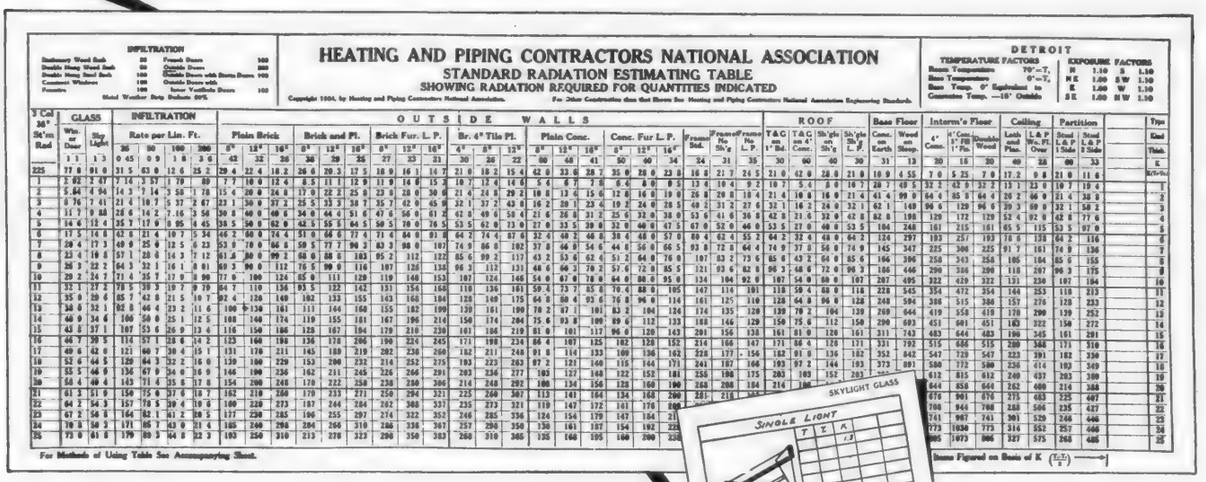
_____ HS

Skinner Brothers *Engineered* Heating

1450-90 S. Vandeventer, St. Louis, Mo. **New York Office: 1710 Flatiron Bldg.**

Originators of the Unit Method of "Work-Area" Heating

Save Your Time and Money


HEATING AND PIPING CONTRACTORS NATIONAL ASSOCIATION
STANDARD RADIATION ESTIMATING TABLE
SHOWING RADIATION REQUIRED FOR QUANTITIES INDICATED

Be Absolutely Sure Your Radiation Estimate Is Correct

"Engineering Standards," the book on radiation, compiled and published by the Heating and Piping Contractors National Association takes the guesswork out of Radiation Estimating.

It is a reliable guide that thousands of heating contractors are using. It reduces radiation estimating to a science, with a series of tables including 151 constants for various types of construction and thickness of wall, also infiltration and exposure factors.

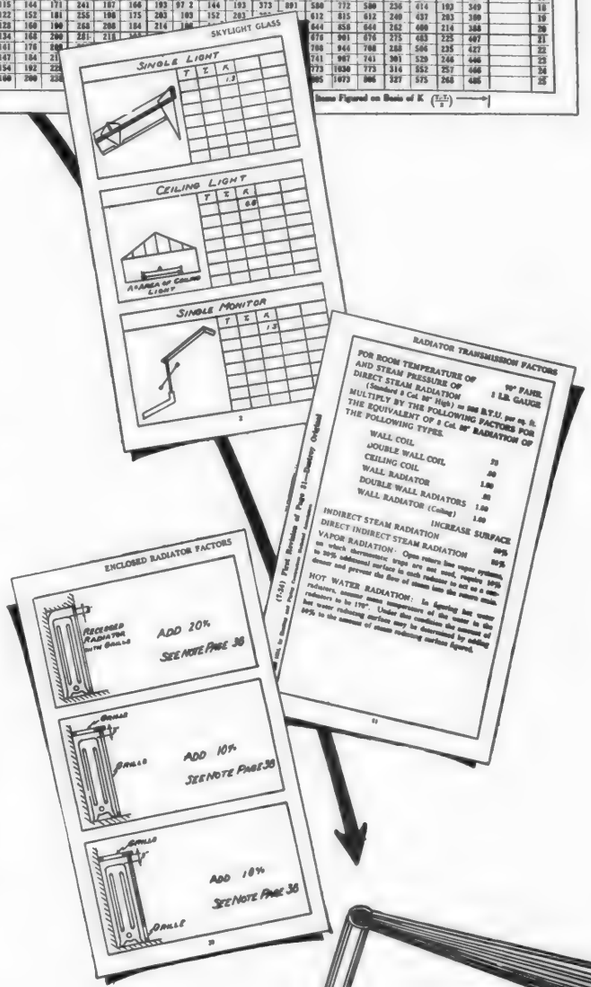
Standard Radiation Estimating Tables for the twenty-four cities listed below are available in addition to this comprehensive book:

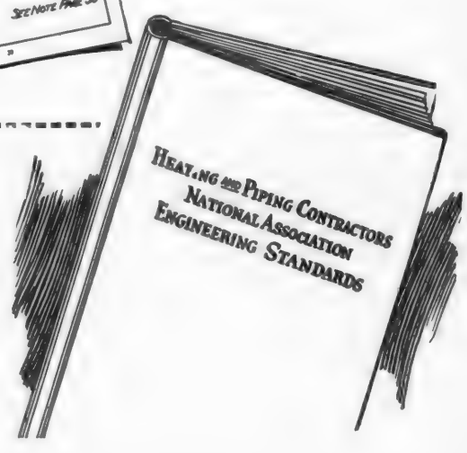
Birmingham	Eastport, Me.	Pittsburgh
Boston	Kansas City, Mo.	Portland, Ore.
Buffalo	Los Angeles	Salt Lake City
Chicago*	Madison, Wis.	San Antonio, Tex.
Cincinnati	Memphis, Tenn.	San Francisco
Denver	Milwaukee*	St. Louis
Detroit	New York	St. Paul
Cleveland	Philadelphia	Washington

*Chicago and Milwaukee Tables are identical.

The Heating and Piping Contractors National Association, now in its 39th year, comprises America's leaders in heating and piping work. "Engineering Standards" is a notable example of the beneficial work of that organization.

The complete work, including data on pipe sizes, in a loose-leaf binder may be obtained by readers of this magazine for $5.00—a cost which is small compared with the money and time it will save you in correctly estimating radiation.





HEATING AND VENTILATING MAGAZINE,
386 Fourth Avenue, New York, N. Y.

Send me copy of "Engineering Standards" complete with all data necessary to correctly estimate radiation in any type of building. Also include Radiation Table for City of .....
(If your city is not listed, request chart for city nearest to your locality).
Enclosed find $5.00 to cover cost and postage.

Name .....

Address .....

City and State .....

Designed for HEATING

Thermodine Unit Heater No. 701—replaces 2 tons of cast iron radiation.

Remarkably Successful for DRYING

Thermodine Unit Heaters drying hides in Trimount Leather Co., Peabody, Mass.

Killing steam as it rises from giant paper machines, thereby preventing condensation on ceiling and walls. Byron Weston Co., Dalton, Mass., "Mfgrs. of High Grade Ledger Papers"

Thermodine Unit Heaters drying automobile bodies in the Seaman Body Corp., plant, Milwaukee, Wis.

SIX years ago, Thermodine Unit Heaters were introduced as a new and better method of industrial heating. Today, we find them successfully used in a wide variety of applications.

Thermodine Unit Heaters have cut down drying time and reduced cost of automobile body drying, drying paint on steel lath, radiator cabinets. They are used most effectively in paper manufacture, in the drying of sausage — in tanneries for drying hides — felt hat manufacture—rug cleaning plants—bottling works to dry bottles before labeling—paint and varnish rooms — hotels and restaurants for drying dishes — bath houses for drying bathing suits — apartment house laundries — salt drying — seed corn drying — and in many other operations.

Because of their great heating capacity, small size and flexibility, Thermodine Unit Heaters prove highly successful for almost any drying application. They deliver heat where it's needed and keep it there. Are economical to install and operate. *For any heating or drying problem, write for catalog No. 127.*

MODINE MANUFACTURING CO.
(Heating Division)
1707 RACINE STREET RACINE, WIS.
(Branch Offices in all large cities)
London Office: S. G. Leach & Co., 26-30 Artillery Lane, London, Eng.

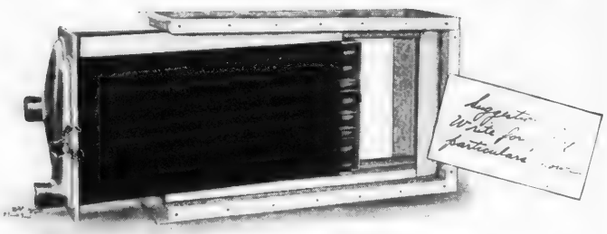
ThermoDine Unit HEATER

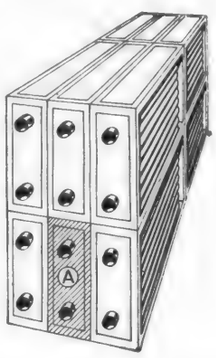
a MODINE Product

For Steam or Hot Water Heating Systems

Removable Coils

a feature of YORK SUPER-FIN





BY NO MORE EFFORT than loosening *four bolts*, the coils in an encased York Super-Fin Unit can be entirely removed from the casing.

This feature is a time and cost saver as often as coils are given a thorough cleaning. The casing may be permanently fixed in place and need never be touched.

When Units are stacked, it is only necessary to separate the two connections of the Unit which is to be given attention. As in diagram shown here—if Unit A is to be cleaned, only Unit A need be touched. If coils were not removable, the entire upper stack would have to come away,—six connections to unhook and three extra Units to unbolt.

The removable-coil feature is an exclusive York Super-Fin advantage. Write for full description of this York *engineered* product. York Heating & Ventilating Corp'n, 1539 Sansom Street, Philadelphia, Pa.

YORK SUPER-FIN RADIATION

York Heating & Ventilating Corp'n

Engineered Products—Including

YORK HEAT-DIFFUSING UNIT

Philadelphia

BRANCHES IN PRINCIPAL CITIES

Popular

NONE of the above food products need an introduction because they have so well met the taste of the people throughout the entire country. They are *popular* because they are *made right* under exacting conditions to maintain the *high standards* upon which their *quality* is based.

Why were GARDEN CITY FANS chosen for use in the plant of the Corn Products Refining Co., manufacturers of the above products? Working conditions must be right, particularly in producing food products.

GARDEN CITY FANS have been *popular* with many architects and engineers for more than 30 years, because of their reputation for giving *long, uninterrupted service.*

Do you know about the fan bearings?—dust-proof, oil tight, automatically chain-oiled, large reservoirs with plugged openings for drains. Each bearing is at least four times the diameter of the shaft. Let us send full mechanical details.

Also manufacturers of Cyclo-Fin Unit Heaters and all types of fans and blowers.

Garden City Fan Company

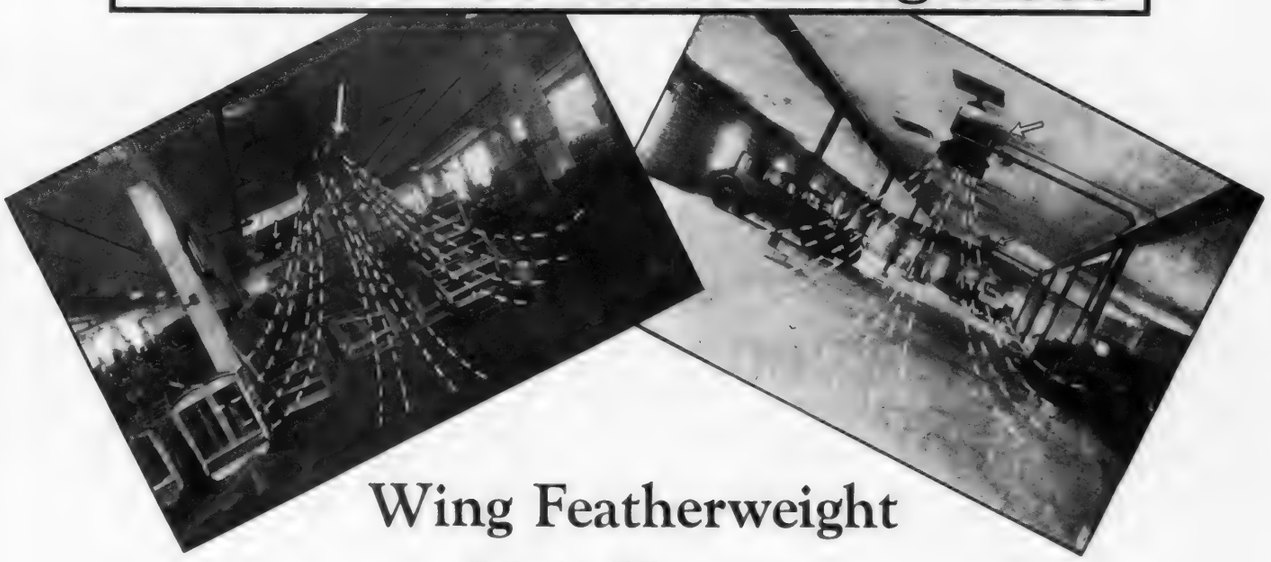
Manufacturers Since 1879

McCormick Bldg., Chicago, Ill.

Eastern Office: 55 W. 42nd St., New York City

Wing Down Flow Principle

Puts Heat at the Working Floor



Wing Featherweight Unit Heaters

THE Wing Principle of down-flow heating guarantees warmth at the working level, the place where comfort is desired. The Wing Method recognizes that the upper spaces are a great congregation place for heat units. Therefore it constantly withdraws the warm overhead air and re-delivers it through several outlets to the working floor. This common sense method prevents the accumulation of high temperature air under the roof. Therefore heat is saved, and saved heat means less money paid for fuel.

Because of their overhead position, and their light weight and small dimensions, Wing Featherweight Unit Heaters are naturally easy to install. Only simple piping and fittings are needed. No pipe trenches, no sub-grade boiler rooms required.

Write for Wing Heater Bulletin

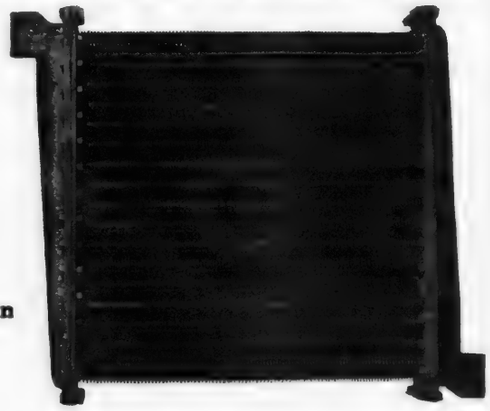
Fans
Blowers
Turbines
Exhausters

L. J. Wing Mfg. Co.

158 West 14th Street, New York, N. Y.

HEAT with Unit Heaters

HELICALFIN



Seamless Copper Construction

EXTENDED SURFACE RADIATION

Meets the Demands of Modern Heating and Ventilating Progress

For Permanence and High Efficiency Specify

Rome Helicalfin Tubing

Helicalfin Heater Units and Radiators offer great advantages in high efficiency. The cores consist of tubes and headers made of copper and brass. They are sturdy, compact, light in weight, and last indefinitely with practically no corrosion.

Helicalfin Heater Units and Radiators are the ideal heating equipment for Homes, Schools, Institutions and Industrial Plants.

Rome Helicalfin Radiation has from five to nine times radiating surface of plain tube with proportionate increase in efficiency.

Engineering data covering the performance of Rome HELICALFIN Heaters has been prepared by a nationally known test engineer and is available upon request.

Makers of Good Radiators since 1905

ROME-TURNEY RADIATOR COMPANY
ROME, N. Y.

TYPHOON

Multiblade Disc Blower

Disc Blowers
Centrifugal Blowers
Belt-driven Direct-connected
Unit Drive Fans
Unit Heaters
Ventilating Systems
Air Conditioning Systems

Typhoon Products and Typhoon Systems have been installed all over the country and all over the world. Typhoon is an international standard of efficiency for cooling, heating, and ventilating systems.

TYPHOON FAN COMPANY
345 West 39th Street
New York City
Dealers' and engineers' inquiries invited

EXCEPTIONAL ADVANTAGES IN *AUTOMATIC* START-STOP SERVICE

Here is the outstanding example of efficiency in Repulsion Induction Single Phase Motors, meeting alike the requisites of utility companies and ultimate user. Baldor Type R. S. Let us explain our co-operative engineering service.

BALDOR ELECTRIC COMPANY

4356 DUNCAN AVE. ST. LOUIS, MO.

Write for Bulletin RS27.

BALDOR
A BETTER MOTOR

This is Our Idea of an Efficient Indirect Heater —do you agree with us?

—***uniform pipes:*** of precisely the same length and built in precisely the same way.

—***no short circuits:*** flow of steam, air and water always in one direction; no opposing counter currents. Circulation being free and positive every square foot is prime heating surface.

—***expansion:*** no racking by expansion and contraction each pipe being separate and independent. No rigid connections, return bends, nipples or elbows to be racked out of shape.

—***connections:*** steam and drip connections very simple. No double decking with double steam and return connections required to obtain necessary heating area.

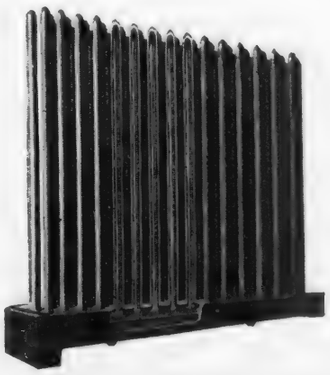
—***ample steam supply:*** operates efficiently on either low or high pressure.

—***efficient regardless of position*** — base horizontal, pipes vertical or pipes horizontal base vertical, or base and pipes flat.

—***all pipes wrought steel*** — rust and corrosion proof.

—***can be shipped knocked down*** — eliminating handling and erecting of heavy, bulky units.

Bayley Chinook Heater—the most improved form of indirect Heater. Construction is such that there are no return bends, elbows or nipples. Permits use of steam at either high or low pressure.



That briefly is the Bayley concept of an efficient indirect heater and the manner in which the Bayley Chinook Heater is built. Many installations have proven it successful. May we tell you where they are and state the argument more fully by means of our Bulletin No. 30?

BAYLEY BLOWER COMPANY
742 Greenbush Avenue Milwaukee, Wisconsin

Bayley

AIR ENGINEERING & EQUIPMENT

HEATING AND VENTILATING
AIR WASHING AND HUMIDIFYING SYSTEMS
MILL EXHAUSTERS — PRESSURE BLOWERS
MECHANICAL DRAFT FANS
AIR AND GAS SCRUBBERS
INDUSTRIAL DRYING SYSTEMS

SPRACO Filter Cell.

Air Filters

that clean properly because they are built on the right principle

Cleaning the air of dust, dirt and foreign matter is simple enough with the right equipment.

Spraco Air Filters do this most efficiently and economically because of the following reasons: The filter media provides the greatest possible dust collecting surface within a given space, and is arranged so as to change abruptly and continuously the small streams of air passing through it. It consists of a stack of expanded metal sheets arranged from coarse to fine in direction of air flow. It is made adhesive by dipping or charging the cell with a special solution called "Dustix." *Air cannot pass through this media without being effectively cleaned.*

The progressive arrangement of the media from coarse to fine mesh insures high cleaning efficiency with minimum obstruction to air flow.

The use of sectional framework is another important advantage of Spraco Air Filters. It eliminates air leakage, insures perfect alignment and greater strength and rigidity, and low cost of erection. Each section accommodates several cells and can be made to fit the space available. All metal construction.

Consult us about your air filtering, conditioning, washing and cooling problems. Ask for Bulletin F-81.

SPRAY ENGINEERING CO.
60 High Street, Boston, Mass.

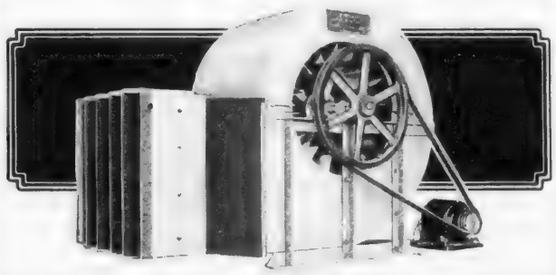
Cooling Ponds
Spray Nozzles
Strainers
Park Sprinklers

Air Filters
Air Washers
Air Coolers
Flow Meters

ENGINEERS *and* TRADE MARK MANUFACTURERS

SPRACO
BOSTON

Cable Address: "SPRACO," Boston; Western Union Code



Good Ventilation Makes Business Good

The Lakeside Four-Way Deflector System was designed especially for use in theatres and buildings where quiet operation is absolutely essential. The patented Tex-rope Drive [wedge shaped belting] SKF Bearings throughout, specially designed and perfectly balanced impeller [installed off-center] and specially designed, quiet running low-speed motor insure freedom from noise, friction and vibration.

EASY TO INSTALL

The Lakeside comes ready for installation. It requires no tearing down of walls or ripping up of floors to put in service. It is so compact that it fits into a very small space, and can be dis-assembled easily into three parts of convenient size to move through small door openings. Quickly installed, without great expense or interruption of business.

Write for Catalog which gives specifications, dimensions and capacity ratings of Lakeside Ventilators, which are made in sizes to meet practically every requirement.

LAKESIDE COMPANY, 104 Main St., Hermansville, Mich.

Lakeside

Quiet *Electric* VENTILATOR

For Heating and Ventilating Use

Millions of Positive Starts and Stops

By eliminating a riding contact friction wear is practically eliminated in the Emerson automatic cutout. An important advantage in fan installation where the time required to attain normal speed and the longer time consumed in coasting may result in quick wearing of cutout mechanism.

Over 2,000,000 starts and stops under test.

Full details on request

1/30 to 2 hp
A.C. and D.C.
For all commercial currents.

THE EMERSON ELECTRIC MFG. CO.
2018 Washington Ave., St. Louis, Mo.
806 W. Washington Blvd., Chicago, Ill.
50 Church St., New York City.

EMERSON MOTORS *and* FANS

EVEN WHERE AIR IS "CLEAN"!

Reed Filters on *World's Largest* Automatically-Controlled *Hydro Plant*

ENGINEERS who designed the new 80,000 kilowatt, $7,500,000 hydro plant of the Louisville Gas & Electric Co. knew that even in isolated, water-surrounded plants, air filtration is necessary to protect the life and efficiency of costly electrical equipment. To insure the highest degree of cleaning efficiency, economy and dependability in operation of equipment, a 67,000-C. F. M. Reed Air Filter was therefore installed.

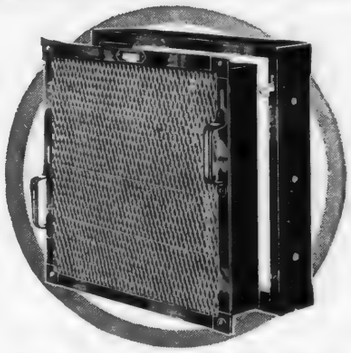
Even if you are located in a so-called "clean" district, our engineers can show you the economy of *filtered* air and how Reed can furnish it with unfailing efficiency and at minimum cost. Use the coupon.

REED AIR FILTER CO., *Incorporated*, 218 Central Ave., LOUISVILLE, KY.
World's Largest Manufacturer of Air Filters
Representatives in Principal Cities

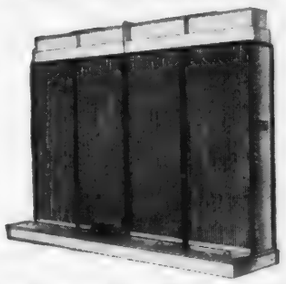
Reed Air

TRADE MARK

filters ALL METAL



Two Types of REED *Air Filters*



Top: The Reed Standard Unit, over 250,000 of which are now cleaning more than 200,000,000 C.F.M. *Guaranteed* efficiency, 97% to 99%. *Below:* The Reed Streamline Filter. Entirely automatic. Constant low air resistance. Stationary media. No mechanical movement. No personal attention required.

Use This

REED AIR FILTER CO., *Incorporated*
218 Central Ave., Louisville, Kentucky

Send, without obligating me, full particulars about the Reed Automatic Air Filter ☐ The Reed Standard Unit Air Filter ☐

Name ..... City ..... Possible Use .....

Company ..... State .....

A Valuable Service to Architects, Engineers, Contractors and Business Executives

The successful functioning of an air cleaning installation depends not only on the equipment itself, but also on the effectiveness with which the entire problem is worked out.

Heading the General Air Filters Engineering Department is a man who is recognized as an authority on the science of air cleaning and conditioning. Virtually his whole career has been spent in this work.

The G. A. F. Automatic, Self-Cleaning Air Filter

Typical large unit, normal capacity 90,000 CFM. Completely eliminates human element from filter operation.

Supplementing his technical knowledge and broad practical experience is the comprehensive experience of the entire G.A.F. organization, gained through the working out of the hundreds of applications on which its equipment is being used.

Architects, Engineers, Contractors and Business Executives will find it profitable to capitalize on this experience by availing themselves of the full co-operation offered for the solution of all problems pertaining to the cleaning and conditioning of air.

The proven excellence of G.A.F. equipment makes this all the more desirable.

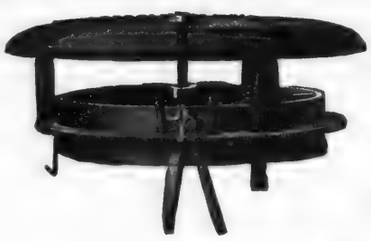
Write for the NEW Catalog on Air Filters.

General Air Filters Corp.

Division The W. B. Connor Co. Inc.

369A Lexington Ave., New York

Manufacturers of Air Cleaning and Conditioning Equipment, Air Filters, Air Washers, Spray Nozzles



E-Z DAMPER GRIP-TITE Floor Vents

POSITIVE AIR CONTROL AT FLOOR LEVEL

ÆOLUS DICKINSON

3338-44 So. Artesian Ave. CHICAGO

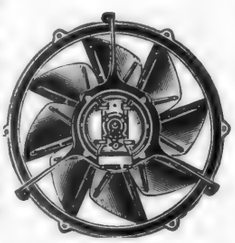
(Some territory open for agents)

JAMES M. SEYMOUR

Established 1888

Lawrence St., Mechanic St. and Kirk Place, NEWARK, NEW JERSEY

AUDITORIUM FANS, 36" to 120" to fit any square opening. SEYMOUR FANS sold subject to substantial discount. Furnished with suitable pulley or coupling for direct connection TWIN FANS include shafting and center bearing.



Special Fans for Cooling Towers, Heating Systems, Induced Draft, Forced Draft, Dry Rooms, Dry Kilns.

SEND for BULLETINS, PRICES, and DISCOUNTS

MANUFACTURED WEATHER

Carrier AIR CONDITIONING AND DRYING EQUIPMENT

makes

"Every day a *good* day"

Air Conditioning

Humidification, Dehumidification
Centrifugal Refrigeration
Cooling of Public and Industrial Buildings
Temperature and Humidity Control

DRYING AND PROCESSING

Carrier Engineering Corporation

Offices and Laboratories

NEWARK, NEW JERSEY

SALES OFFICES

New York Philadelphia
Boston Chicago
Cleveland
Los Angeles
Kansas City
Washington

See our detailed data in A. S. H. & V. E. Guide.

Literature on request. Write concerning your specific problem.

Consider the human factor in Air Filter Service

EVERY non-automatic air filter is dependent on some service man to keep it working effectively.

Obviously then, the better the service man the better the results from any filter.

But the type of work included in "servicing" determines to a large degree the kind of man you can get for the job.

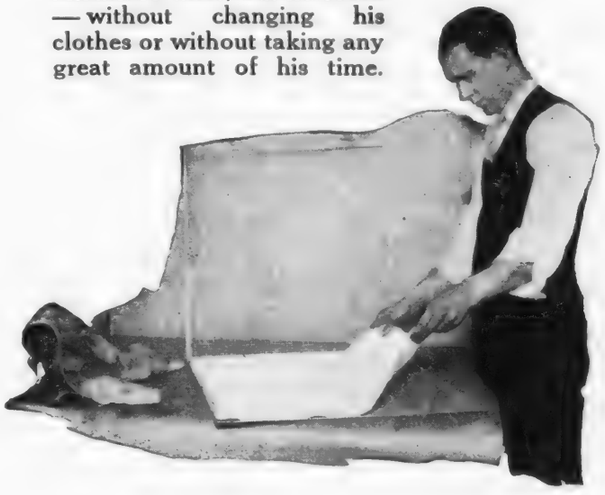
One of the big advantages of the AIRMAT is that servicing is reduced to a simple job that can be handled in a short time without any of the inconveniences that have accompanied such work on older types of equipment.

It is no more difficult to change the filtering medium in an AIRMAT cabinet filter than it is to change the blotter on your desk. Any available man can combine the servicing of an AIRMAT with his other duties. The character of the work is not repellent to good men. They will do it without constant supervision.

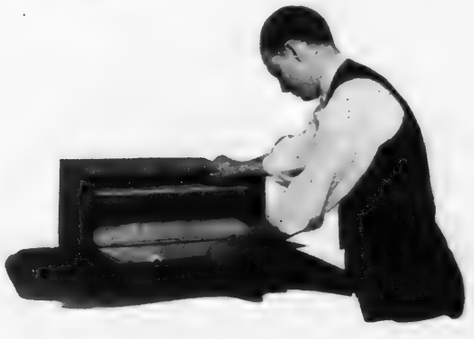
Labor cost is low for servicing the AIRMAT. And, better still, you are assured of a high standard of servicing because you can use a better human factor.

This Man

might not be assigned to handle the servicing of an AIRMAT filter, but he could — without changing his clothes or without taking any great amount of his time.



In the illustration at the left, he has just laid the dirty sheet of AIRMAT out of the frame and is placing a clean one in position. Below he is shown pushing the frame with its clean filler into place in the cabinet. This is all there is to renewing the AIRMAT. Labor cost is cut to practically nothing and the work has no disagreeable features. There is, therefore, no tendency for the service man to slight it.



Our new booklet describes the AIRMAT in detail. Ask for your copy

NATIONAL AIR FILTER COMPANY

5130 Ravenswood Avenue
Chicago, Illinois

H&V-6-Gray

ACID FUMES

THE high velocity of acid fumes when drawn through an exhauster accentuates the attack.

Protective coatings or linings are therefore subjected to conditions so severe they cannot in most cases stand the gaff. This means the fan must be constantly inspected and frequently resurfaced.

Solidly resistant to acid fumes and the condensate formed, Duriron exhaust fans require neither protection nor inspection. And they are operated at much higher speeds than those of lead or stoneware.

The line of Duriron fans is complete between capacities of 100 to 5000 cubic feet per minute.

These fans are used extensively for ventilating Laboratories, Battery Rooms, Pickling and Bright Dip Plants —in fact in all places where it is necessary to exhaust acid fumes.

Fan Bulletin 140-A (A.I.A. File No. 30d1) should be in your files. Write for it.

SEE THIS NAME DURIRON ON EVERY PIECE

Duriron is produced only by

The DURIRON COMPANY DAYTON·OHIO

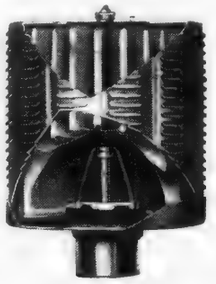
Catches All the DUST

SAND AND GRIT IN DIRTY AIR

Triples Life of Compressors, etc.

The Protectomotor Air Filter removes 99-9/10% of the dust, grit, sand and other foreign matter from the air before it enters Diesel engines, compressors, blowers, compressed-air tools, etc. That keeps valves free from carbon—reduces carbon deposits 60 to 70%.

As a result 75 to 85% of the wear on moving parts is eliminated. Machines are kept new and more efficient so they will do more work and can be operated from three to five times longer than unprotected machines before overhauling is necessary.



Protectomotor

The Protectomotor occupies small space. Costs but little to install and nothing to operate. Has no moving parts to wear or get out of order.

Easily cleaned in ten minutes while in operation. Cleaning is necessary only twice a year under ordinary conditions.

Protectomotor Pipe Line Filter

Pipe lines equipped with the model CP Protectomotor Filter will deliver clean, dry air for paint spraying, compressed-air tools, hoists, cleaning operations, agitating liquids, ice-making, chemical processes, etc.

Sectional View Model C P Pipe Line Filter

It removes all water, oil, rust, scale and other foreign matter from air passing through pipes and prevents wear and damage caused thereby to tools and other compressed-air equipment.

Made in sizes to meet every requirement. Over 250,000 Protectomotor Air Filters in use.

Free Trial Offer

Let us send you a Protectomotor on 30 days' free trial. If it does not do all we claim, return it and the trial won't cost you a cent.

Write for booklet

Staynew Filter Corporation

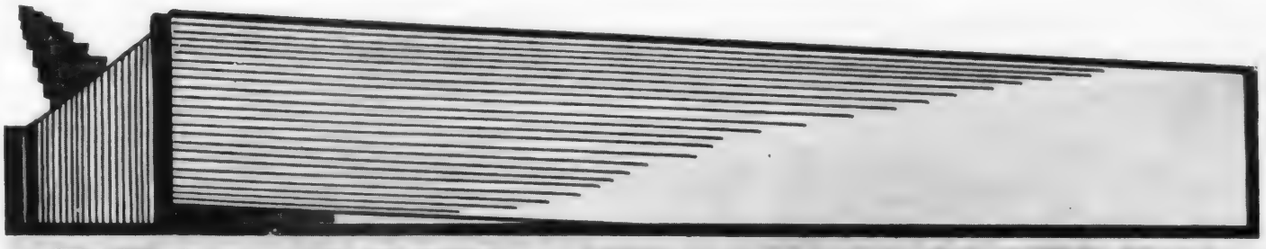
109 N. Water St., ROCHESTER, N. Y.

PROTECTOMOTOR

REG. U.S. PAT. OFF.

Perfect Positive Protection

AIR FILTERS



REAL OPERATING ECONOMY

OVER
10,000
SQ. FEET
(HANDLING 120,000 C.F.M.)
OF CONCENTRATED, HIGHLY EFFICIENT FILTER MEDIUM IN THE MIDWEST AUTOMATIC HORIZONTAL AIR FILTER ARE EFFECTIVELY CLEANED BY LESS THAN
1/2 H.P.

BEFORE the advent of automatic air filters, research and experiment brought manually cleaned unit types to the highest known stage of efficiency. There was no sacrifice then to matters connected with mechanical washing of the medium.

Today, Midwest Automatic Horizontal Air Filters retain this old efficiency unimpaired and—what is equally important—accomplish cleaning of this highly concentrated filter medium at a minimum expenditure of power.

MIDWEST AIR FILTERS

INCORPORATED

BRADFORD, PA.

Offices in Principal Cities

Real Beauty—with More Efficient Heating

McQUAY
Concealed
RADIATOR

It is no longer necessary to clutter up rooms with old-fashioned radiators. For McQuay *Concealed* Radiators heat rooms quicker and better, without using any floor space, and without detracting from appearance.

An artistic grille, and a small opening at the baseboard are the only things visible.

The Heating Unit

A distinctive McQuay development found in all McQuay products has been proved by many tests to be far more efficient than ordinary radiators.

With McQuay Radiators the warmed air is impelled into the room, thru the grille, with sufficient initial velocity to insure positive circulation, thus heating rooms quicker, more comfortably and with greater efficiency.

The entire Radiator is immune from corrosion, will not clog and is practically indestructible.

Ask for literature describing McQuay

Cabinet Radiators
Concealed Radiators
Unit Heaters

McQUAY RADIATOR CORPORATION

General Sales Office: Pure Oil Building, Chicago
Eastern Branch: 2148 Graybar Building, New York City
New England: 164 Federal St., Boston
Branches in most principal cities

Blake Cast Iron or Brass Water Heaters

Nothing to Compare With These Either in Price or Efficiency

K-1320 K-1325 K-1330 K-1335 Cross Section

Made to fit any size Boiler or Furnace. Heating surface one foot. Will carry 35 ft. of Radiation. Most suitable Water Back for 30 or 40 gallon Range Boiler.

Brass Cleanout at Bottom for Blowing out Sediment.

Fig. K 1320—Lengthened out for any Holes in Boiler. Fig. K 1325—2½" Centers—K 1330—2" Centers. K 1335—9" Centers.

Tappings ¾ or 1 inch—Measurement 2¼x3¼x12. Weighs about 8½ lbs.

Your Jobber Will Furnish Them

BLAKE SPECIALTY CO.
ROCK ISLAND, ILL.

CONTROL THE SPEED
OF YOUR VENTILATING EQUIPMENT!
REGULATE WARM AND COLD AIR VOLUME

WITH THE TIME TESTED

HORTON
VARIABLE SPEED
PULLEY

HORTON MANUFACTURING COMPANY
3008-3016 University Avenue S.E. Minneapolis, Minn.

MINNEAPOLIS REFERENCES
Morgan-Gerrish Co. Richardson-Boynton Co. Yeoman Cook Co.
American Foundry & Furnace Co., St. Paul

Fabricated Tubing

An experienced, efficient Manufacturing Division is at your command. Send your Seamless Tubing assembly specifications and blueprints to us for prices.

WOLVERINE TUBE CO.

SEAMLESS COPPER **BRASS & ALUMINUM**

1415 Central Ave. **Detroit, Michigan**

Sales Offices—Cleveland; Chicago; Atlanta; Los Angeles; Denver; Rochester, N. Y.; Dayton, Ohio; Dallas, Texas; New York City.

Pop stands—still

"Here, Lad—

I don't care what you say about nearly all the factories in town adopting 'Linc-Weld' motors. That's their privilege. It is MY privilege to stick to a motor maker who doesn't change to modern doo-dads and I stand up for his rights."

"No, Pop—

you stand up for his wrongs.

You STAND for the other motor, yet you SIT on 'Linc-Weld' for stepping out from traditional custom and making double size shafts and bearings for the specific purpose of obviating stand-ups in production.

You STAND for application of the other motor to our machines when 'Linc-Weld's' whole reputation is built on overload capacity and cool operation on heavy drags.

But since you DO stand for them—I know the reason:

You've been kicked around by the makers so long—and I've kicked about them so long—and the machine operators have kicked so hard and often—

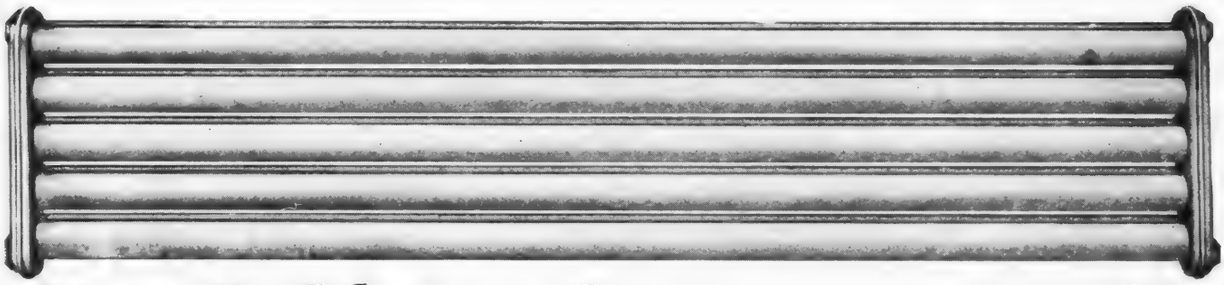
—you can't do anything BUT stand."

"Linc-Weld" Superiority is due to:

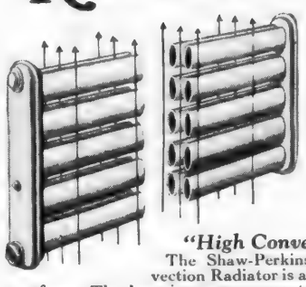
1. **Larger Shafts**
2. **Larger Bearings**
3. **Better Insulation**
4. **Stronger Frame (Steel)**
5. **Greater Overload Capacity**

The Lincoln Electric Co., Dept. 16-6, Cleveland, Ohio

"Linc-Weld" LINCOLN MOTOR



Shaw-Perkins
HIGH CONVECTION
Radiators



"High Convection"
The Shaw-Perkins High Convection Radiator is all prime heating surface. The ingenious arrangement of the oval tubes allows the air to pass freely over the tubes, unimpeded by fins, baffles, or top and bottom hub connections, consequently the radiator has a high heat emission by convection.

Send for Catalog

Narrow One-Piece Radiators as Long as 14 Feet

Light in Weight: Shaw-Perkins High Convection Radiators are built in low, narrow one piece, jointless units, as long as 14 feet and weigh about one-third as much as other forms of direct radiation.

Heat and Cool Quickly: The light uniform walls cause them to respond promptly to the turn of the valve, giving quick and positive control over room temperatures.

Save Space: The radiators occupy about one-third less space than other forms of direct radiation. Brackets or legs can be supplied for either wall or floor installation.

Absolutely Sanitary: The radiators have no rough surfaces or fins to act as dust entanglements. All surfaces are smooth and easily accessible for hand wiping.

Unusually Adaptable: The light weight, the distinctive design and the unique dimensions of the radiators, make them suitable for installation in heating plants, upon walls, under windows, in recesses, upon columns, pilasters, etc. They are also particularly adapted to various drying and cooling purposes and to many industrial uses.

Get the Full Story of this Modern Radiator
SEND FOR CATALOG "H"

Shaw-Perkins Manufacturing Company
Pittsburgh, Pa.

Service The *Satisfaction*

VECO SYSTEM of VAPOR HEATING

Write us about the Building you want to heat - any building, regardless of size, character or location. VECO gives the same good service wherever installed.

—WE GUARANTEE IT—

VAPOR ENGINEERING COMPANY

PHILADELPHIA—10 So. 18th Street
J. Wilbur Glassey—M. S. Buck

NEW YORK—489 Fifth Avenue
Chas. E. Scott—R. C. Willis

KAUFFMAN

AIR DIFFUSERS

SINCE 1908

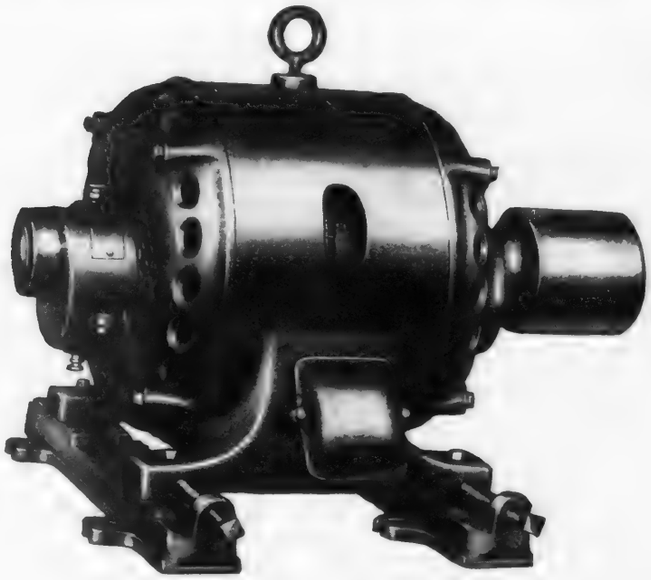
Kauffman Air Diffusers

HAVE BEEN IN USE IN

Some of America's Finest Theatres

Simple to Install—Low in Price
Graduated Air Control

AMERICAN METAL PRODUCTS CORP.
ST. LOUIS, U. S. A.



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Normal Starting Torque

Double Squirrel Cage Induction Motors

Economies and advantages are combined in Century Type DSCN Double Squirrel Cage Normal Torque Induction 3 and 2 Phase Motors .... They are suitable for installations where the static torque of a standard Type SC Squirrel Cage Induction Motor on full line voltage is satisfactory, but where it is desirable to reduce the starting current. They develop a starting torque practically the same as a standard Type SC Single Squirrel Cage Induction Motor—and when thrown across the line, *without current limiting equipment*, draw about 20% less current. They cost less to install and maintain because no starting equipment other than a switch is required ...The starting current for 30 horse power and smaller motors is within the N. E. L. A. rules...They take full advantage of the current drawn from the line, because no current is dissipated in starting equipment .... Line disturbances are lessened.

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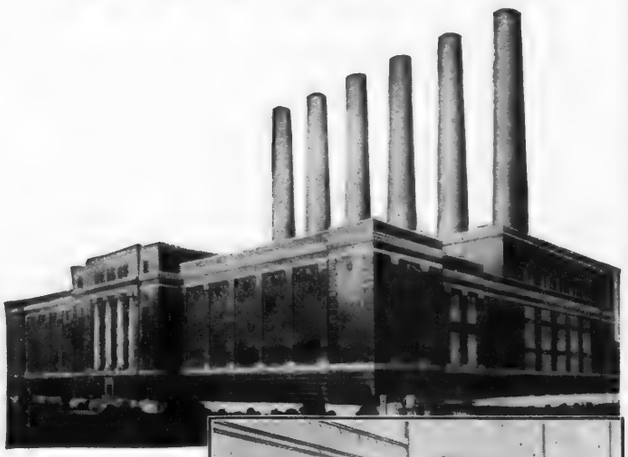

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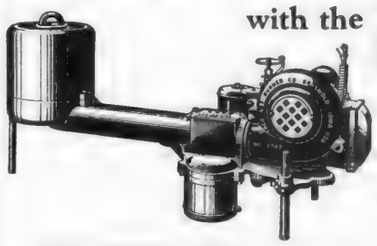

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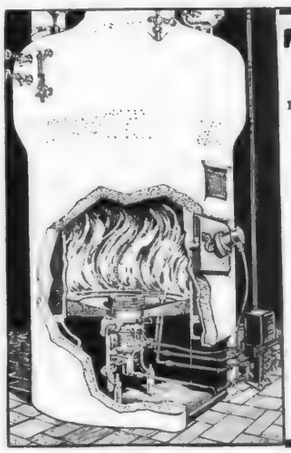

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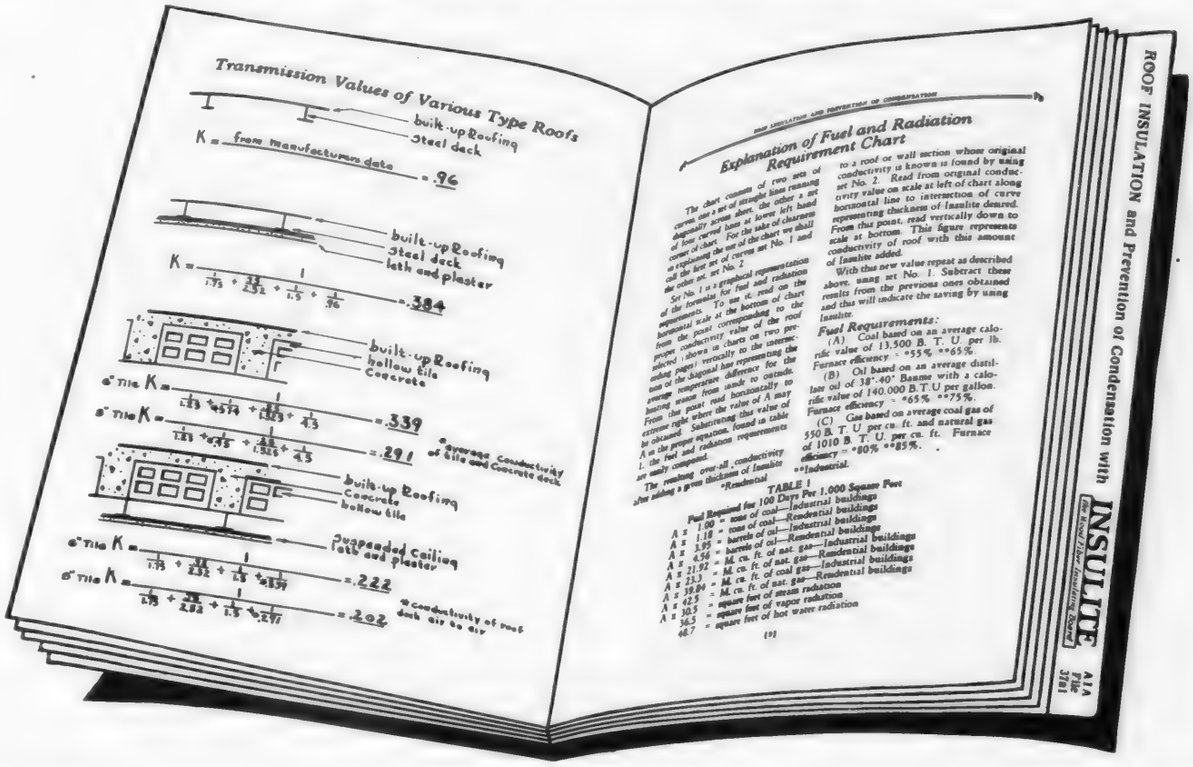

The heating requirements of a building are determined by the ability of the building to hold the heat that is generated.

Heat losses must be reckoned with. Heating and insulation should be figured at the same time. That is the scientific way—the way that decides whether a heating installation is to be the success that you and the owner want it to be.

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the Wood-Fiber Insulating Board

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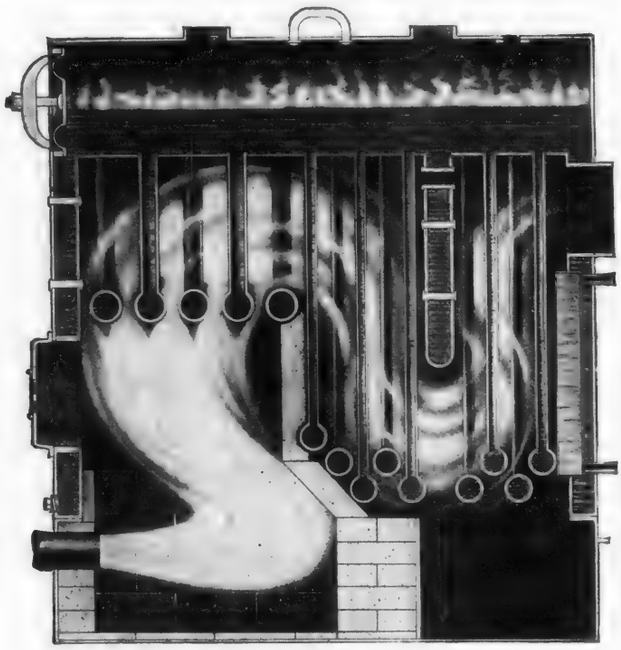
Steel Heating Boiler



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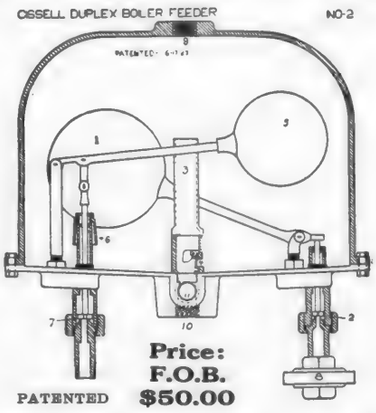
Now is the Time

For Real Boiler Protection

While Also Increasing Its Efficiency



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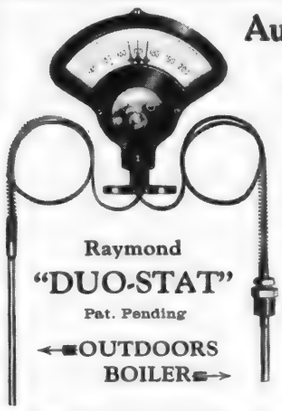

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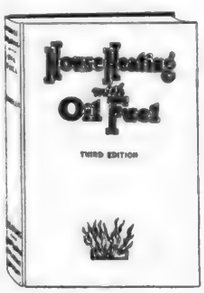

By **P. E. FANSLER,** *Associate Editor, The Heating and Ventilating Magazine*

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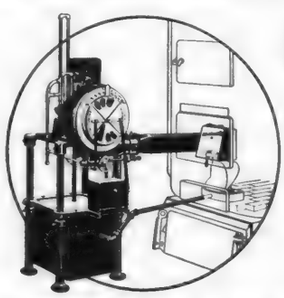

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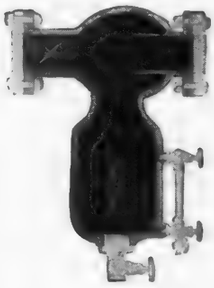

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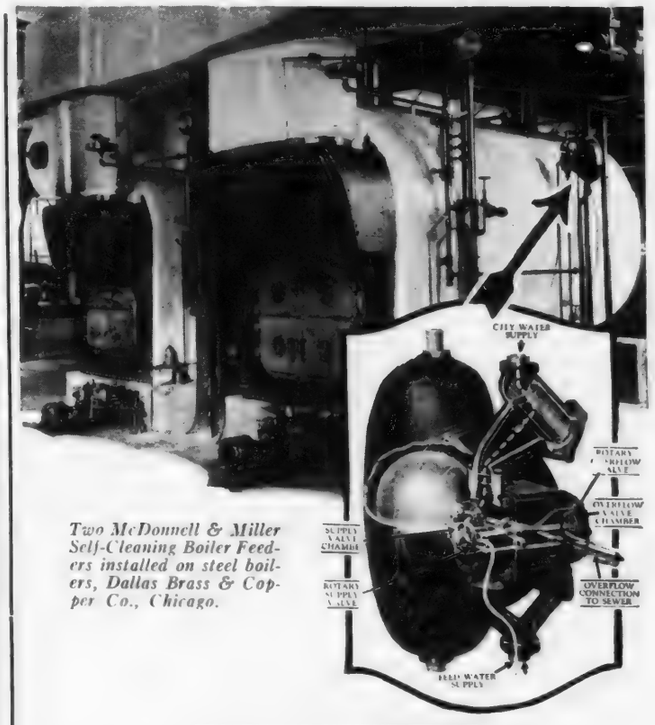

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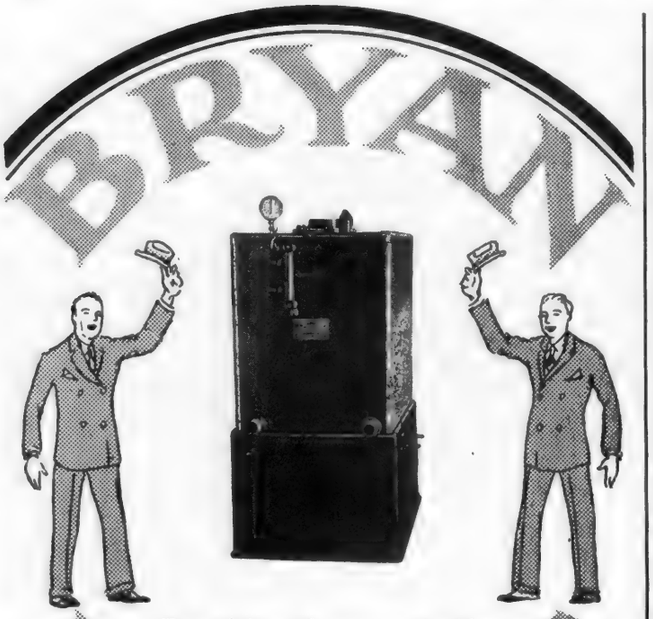

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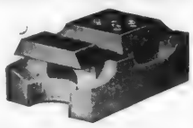

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Patterson Hot Water Heaters

No effort or expense has been too great to make Tudor City the most outstanding development of its kind. It will afford homes for about 10,000 people. Every modern idea that has proved its value and efficiency has been employed.

Patterson Hot Water Heaters and Preheaters (to utilize every available heat unit from the waste condensate from heating systems) were installed in the various units because they are guaranteed to supply all the hot water required, as hot as required and as quickly as required. Also because there is a 47-year-old concern back of that guarantee.

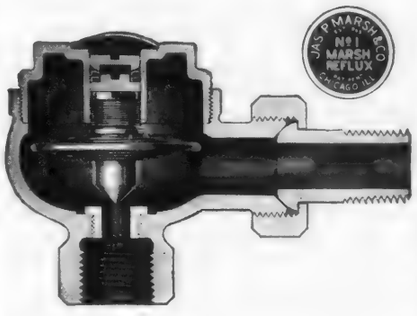
Patterson Hot Water Heaters have been installed in thousands of America's foremost buildings.

If you want dependable hot water service, play safe and specify the "Patterson."

A Catalog and list of installations mailed upon request.

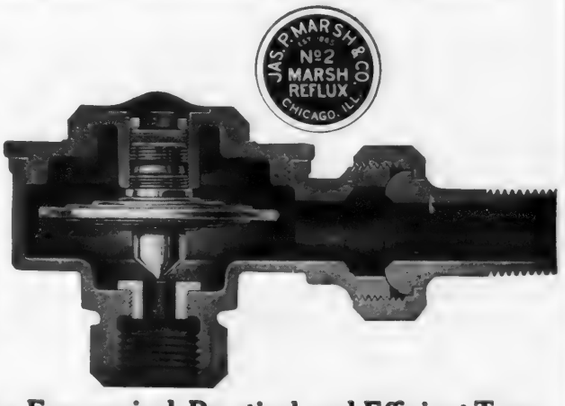
THE PATTERSON-KELLEY CO., 107 East 40th St., New York

MARSH REFLUX THERMOSTATIC RADIATOR TRAPS



GUARANTEE ON EVERY TRAP

If any Marsh Reflux Trap might develop a defect in material, workmanship or operation inside of five years after date of installation, such Trap would be replaced free of charge.



The Most Economical, Practical and Efficient Trap for the Average Sized Unit

Marsh Reflux Traps assure full efficiency of Radiator Coil and System.

Automatically discharge air and the water of condensation as fast as it is formed.

The Trap closes the instant steam or vapor strikes the thermostatic diaphragm. Vapor or steam cannot pass through the Trap; therefore every atom of heat is given off in the radiator or coil.

Just one movable part—nothing loose to rattle, chatter or make a noise.

Neat in appearance, handsomely finished and heavily nickel-plated.

The Economical, Practical and Efficient Trap for Both Small and Large Units

Marsh Reflux Traps are all-metal construction including heavy cast brass body, handsomely nickel-plated and with extra heavy special tail piece.

The one movable part—a genuine phosphor bronze non-collapsible Thermostatic Diaphragm—contains the combination of volatile fluids so balanced as to, at all times, distinguish between air and water of condensation and vapor or steam. So corrugated and constructed to eliminate the slightest possibility of rupture from alternate expansion and contraction.

JAS P. MARSH & CO.

114-124 So. Clinton St. **Chicago**

ESTABLISHED 1865

62 YEARS CONTINUOUS EXPERIENCE IN MANUFACTURE OF STEAM SPECIALTIES

Manufacturers of Radiator Traps and Specialties—Automatic Air Valves and Vents—Indicating and Recording Gauges

Agents for Great Britain and Ireland: Chatterton & Co., 30 Fetter Lane, E. C. 4, London
Agents for Dominion of Canada: Taylor-Forbes Co., Ltd., Guelph, Ontario.

If It's Hot Water

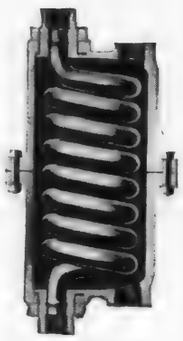
For the smallest residence or the largest apartment house, office building or industrial plant, there is a Paracoil unit designed and guaranteed to fulfil your hot water requirements.

Over twenty years of responsibility and keen engineering skill stand back of these Paracoil water heating units. Each Paracoil heater carries a rigid guarantee both as to workmanship and performance.

Many prominent engineers and architects have given Paracoil Water Heaters their unqualified endorsement.

Write for list of installations, performance records and specifications.

DAVIS ENGINEERING CORP.
90 West St., New York City
Factory: Elizabeth, N. J.



PARACOIL Resident Indirect Water Heaters

Connected below the water line of steam or vapor boilers, furnishes adequate hot water for residences or small apartment houses.

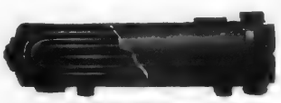
PARACOIL Fire Pot Type Heater

For use with hot air furnaces and hot water boilers in conjunction with Paracoil Indirect Heaters.

PARACOIL Hot Water Storage Heater

For heating and storing large quantities of water for offices, large apartment buildings and industrial plants.

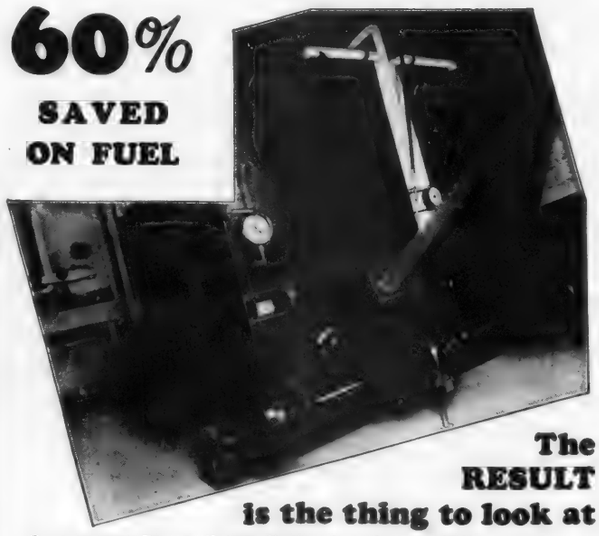
For instantaneous heating of water for apartment houses, office buildings, etc. Unexcelled for indirect heating of private garages and conservatories.



PARACOIL U-Tube Instantaneous Water Heater

Paracoil
STEAM SPECIALTIES

60%
SAVED ON FUEL



The RESULT is the thing to look at

On a recent Brownell installation in a large middle western hospital a fuel saving of more than 60% was obtained, showing most forcibly what can be accomplished when high grade boiler equipment goes in.

This particular job consisted of Brownell Horizontal Return Tubular equipment, including stokers with boilers set at the proper height to obtain best results.

Brownell offers a complete line, every unit meeting ASME and state codes. Consult nearest representative. Also write for Bulletin B-6A.

THE BROWNELL COMPANY, Dayton, Ohio

BROWNELL BOILERS

GRADON MANUFACTURING COMPANY

Heat Exchange Equipment
Expansion Joints — Separators

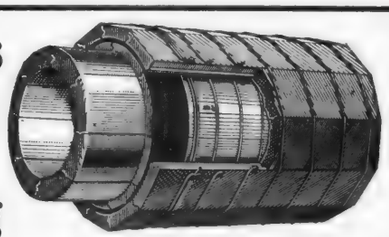
ENGINEERED Gradon PRODUCT TRADE MARK

Engineering Dept.
Land Title Building

General Offices and Plant
East Tioga and Memphis Sts.

PHILADELPHIA, U. S. A.

Wyckoff's Improved Cypress Covering

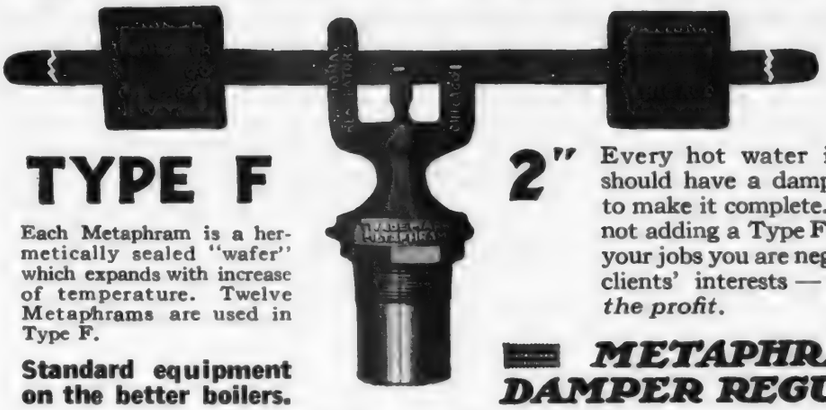


Lasts as Long as The Pipe Itself

As well as being highly efficient in its application, Wyckoff Improved Cypress Steam Pipe Covering withstands all conditions attending steam pipe trenches. All engineers who know Wyckoff Pipe covering specify it because it lasts.

A. WYCKOFF & SON CO. ELMIRA, N. Y.

What Have YOU Lost?



The Ideal Damper Regulator for Closed Hot Water Systems

TYPE F

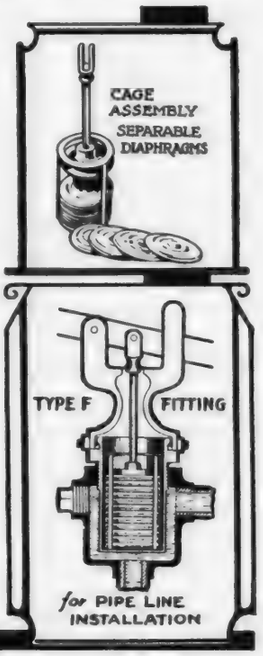
Each Metaphram is a hermetically sealed "wafer" which expands with increase of temperature. Twelve Metaphrams are used in Type F.

Standard equipment on the better boilers.

2"

Every hot water installation should have a damper regulator to make it complete. If you are not adding a Type F regulator to your jobs you are neglecting your clients' interests — and *losing the profit.*

METAPHRAM DAMPER REGULATOR



Saves fuel for the owner because it maintains even temperature by regulating the drafts. Gradual action. One of the most powerful and sensitive damper regulators. Twelve Metaphram expansion units operate in a "dry well" (which is screwed into boiler opening or in special fitting or a Y in pipe line) and which is surrounded by water. Type F operates on slight change of water temperature. Removable without draining boiler.

Make installations more satisfactory to owner and *more profitable to you.* Use Type F on new or old work.

NATIONAL REGULATOR CO.
2301 KNOX AVENUE CHICAGO
Manufacturers of the National System of Automatic Temperature Control

METAPHRAM

W. J. Gilmore Building, Pittsburgh

Could you properly heat a building like this with steam shut off two-thirds of the time?

That's what Hornung Master Control Valves made possible in the heating of the W. J. Gilmore Drug Company Building, Pittsburgh. *Note carefully chart and table below.*

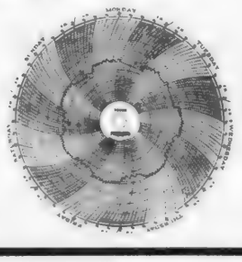
If no customer can use more steam than is really needed, you will save in the boiler room in mild weather, and in cold weather will have enough steam to serve more customers than you can now take on. And complaints from your customers about big bills will stop.

Steam Consumption

	Estimated	Actual
October, 1927	556,000	215,000
November	1,205,000	1,035,000
December	1,668,000	1,204,000
January, 1928	1,853,000	1,496,000
February	1,462,000	1,141,000
March	1,297,000	1,104,000
	8,041,000	6,195,000

SAVING — 1,846,000
With Hornung Master Control Valve

Temperature Chart No. 79903 covers Master Control performance for week ending February 8, 1928. It was taken from Hornung 8" Master Control Valve, controlling both pressures and temperatures in one valve. Clock type thermostat used.



Some of the largest plants in the country are stopping heat waste with Hornung Master Control Valves. Ask us for more particulars.

CENTRAL HEAT APPLIANCES

J. C. Hornung, *Engineer*

343 S. DEARBORN ST., CHICAGO

(4124)

THERMO SYPHON TRAP

For All Types of

Steam Heating Systems

Don't Overlook the Boiler

If you do, there's likely to be trouble. Protect your boiler now and avoid possible delays, expense and serious inconvenience. These come from low water line, resulting in burning or cracking.

Your boiler is safe from troubles of this nature if it is protected by a Thermo Syphon Trap.

All condensation is returned to the boiler, maintaining the water line, regardless of pressure or vacuum.

As well as protecting the boilers, Thermo Syphon Traps assure proper circulation and noiseless operation. Prevent air-bound or water-logged conditions.

Send for Bulletin No. 16-HV, giving full details

LYTTON MANUFACTURING CORPORATION

HIGH GRADE

Return, Vacuum, Lifting and Separating Steam Traps
Reducing Valves Blow-off Valves

FRANKLIN, VIRGINIA

New small size Bristol's Recording Thermometer. Provides continuous temperature record over period of 72 hours.

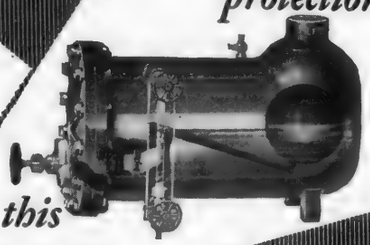
Use It Anywhere!

—to record atmospheric temperatures in refrigerating rooms—storage rooms—theatres—hotels—office buildings—schools, etc. etc. The new Bristol's thermometer illustrated is simply and ruggedly constructed; entirely self-contained, thus easily portable. Accurate, trouble-free operation is assured. Complete information given in Bulletin No. 363. Write for a copy.

The Bristol Company

WATERBURY, CONNECTICUT

Double protection



in this steam trap

THERE is a double safety feature in this sturdy Davis Steam Trap. *Two* valves relieve the condensate, [assuring absolute dependability in service] a characteristic of Davis design. These cone shaped valves, loosely hung, are designed to open away from their seats. Their action is free—they cannot stick!

Controlled by a float the Davis Steam Trap adjusts itself automatically for any rate of flow. With its positive action double valves it has the large reserve capacity necessary for indirect heating, steam and oil separators and wherever the big volume of condensation is subject to great variation. Details are given in the catalog, sent on request.

G. M. Davis Regulator Co.
436 Milwaukee Avenue
Chicago, Illinois

DAVIS VALVE SPECIALTIES
STEAM SAVERS SINCE 1875

H&V6-Gray

The Greater Efficiency of a PEERLESS COAL BOILER

carries satisfaction to every job

—because they are rugged and reliable.

—because they are especially economical to operate.

—because they are carefully tested and honestly rated.

Every Heating Contractor wants to sell satisfaction with each job.

If you can count on every installation giving satisfaction, you can count out complaints and back calls. You can count your *profit* from the initial price of the boiler without making allowances for the deductions that follow in the wake of less efficient installations.

Peerless prices are attractive. Deliveries are prompt.

Write for Catalogue and Price Sheets.

THE PEERLESS HEATER CO.

BOYERTOWN, PA.

AN INSURANCE COMPANY BUYS VALVE INSURANCE

A Donald Douglas Aquatint study of the NEW YORK LIFE BUILDING, New York, N. Y.; Architects, Cass Gilbert, Inc., New York, N. Y.; steam contractor, Baker-Smith Co., New York, N. Y.; plumbing contractor, W. G. Cornell Co., New York, N. Y.; general contractors, Starrett Bros., New York, N. Y.; associate engineers, Meyer, Strong & Jones, Inc., New York, N. Y.

APPROACHING completion on the historic site of the old Madison Square Garden is the new building of the New York Life Insurance Company.

The selection of Jenkins Valves for this building is, in a sense, a valve insurance policy. They are used for steam plumbing and fire protection lines.

In building permanent structures of such imposing proportions, architects, owners and contractors naturally agree on the choice of valves with a record of long-term trouble-free performance.

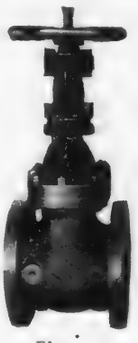


Fig. 253 Jenkins Medium Pressure Iron Body Gate Valve with Outside Screw and Yoke.

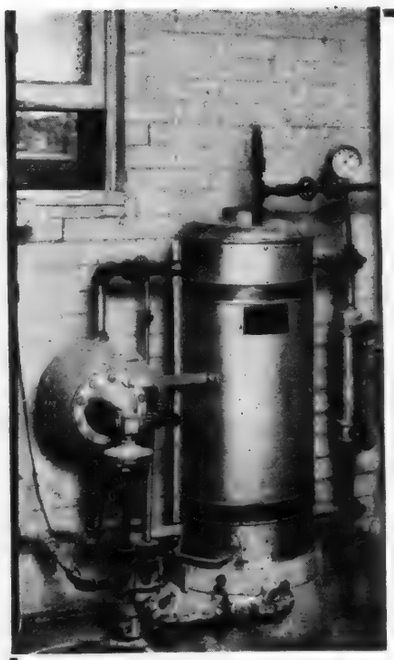
To make sure of Jenkins Service specify Jenkins Valves—marked with the Diamond and Jenkins signature.

Always marked with the "Diamond"
Jenkins Valves
SINCE 1864

JENKINS BROS.

80 White Street.....New York, N. Y.
524 Atlantic Avenue.....Boston, Mass.
133 No. Seventh Street...Philadelphia, Pa.
646 Washington Boulevard....Chicago, Ill.

JENKINS BROS., Limited
Montreal, Canada.....London, England



The Ofeldt is the choice of bakers, candy manufacturers, electrotypers, hotels, laundries, nickel platers, sterilizers, vulcanizers and others who require a dependable and abundant supply of steam.

The Process Steam

problem is no longer a problem when you think of the Ofeldt. Why run a big boiler during Summer or a coal-fired boiler of any size just to secure steam for one or several processes? Why go to the expense of costly and heat-wasteful piping when the Ofeldt can be placed right alongside the job?

Lay out your plant for more convenient and economical production. Be assured of an abundance of steam, without dirt, ashes or laborious coal shoveling. Install the fast-steaming Ofeldt which will give you plenty of steam in 4 minutes, and which will prove itself economical and dependable whether run constantly or "on and off" during the day.

Write for Literature

MEARS-KANE-OFELDT INC.

Manufacturers of

GAS BOILERS AND WATER HEATERS

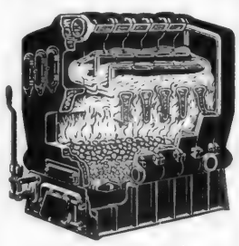
1903-1915 EAST HAGERT ST. PHILADELPHIA

New York—9 Park Place
Boston—100 Arlington St.
Chicago—363 W. Erie St.
Buffalo—Walbridge Bldg.
St. Louis—2010 Locust Blvd.
Los Angeles—940 S. Maple Ave.
Birmingham—American Trust Bldg.

K Winning Cards In Every Pack

Burnham Boilers

for Every Heating Purpose



Your King of Diamonds is

BURNHAM
Square Sectional

BECAUSE—with it you can horn in on the bigger heating contracts sure of the fuel thrifty performance that will make your promises good.

The whole Burnham pack, from the Ace to Jack, is listed in Catalog 67. See what wonderful support your play has in Burnham Supplies and Radiation. Just write.

Burnham Boiler Corporation

Irvington, New York

Representatives in all principal cities of the United States and Canada.

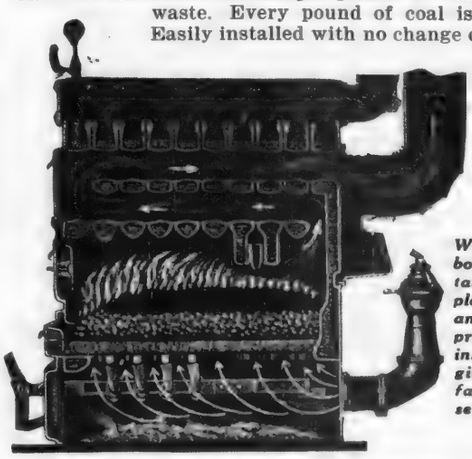
SOLVE THE HEATING PROBLEM

WITH THE COPPUS (REGISTERED U.S. PAT. OFFICE)

UNDER-GRATE DRAFT BLOWER

In Homes, Dwellings, Office Buildings, Garages, Churches, Schools, Public Buildings, etc.

The COPPUS burns the cheaper grades of coal, with no waste. Every pound of coal is burned. Easily installed with no change of grates.



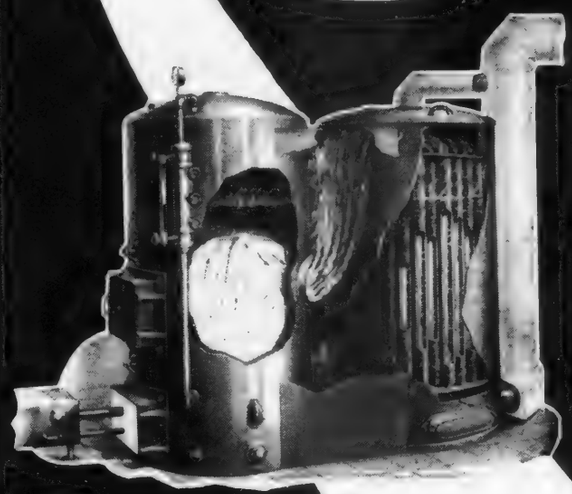
Write for booklet containing complete details and list of prominent installations giving satisfactory service.

INTERNATIONAL FUEL SERVICE CORP.

Sole Distributors in the United States and Canada

BRIDGEPORT, CONN.

Leader KOOLSTACK BOILERS



KOOLSTACK BOILERS *for* Oil Burning

Why Burn 35% to 50% More Fuel? Every Koolstack Boiler installation furnishes working proof that oil burning can be economical.

Koolstack Boilers are first of all economical. They heat quickly. They have far more heating surface than other boilers. They do keep the chimney cool.

Koolstack Boilers can also be used for Coke or Anthracite Coal. They are not intended for use with soft coal.

Write now for catalog on Koolstack Boilers.

LEADER IRON WORKS

2150 N. Jasper St. DECATUR, ILL.

Eastern Division—21 E. 40th St., New York, N. Y.

SARCO

Radiator Traps

were chosen for this great office building because of their reputation for economical and dependable operation in hundreds of modern buildings.

Here are some of the advantages of the Sarco which appeal to architects and engineers:

It has unusually long life because the metal in the expansion element is stressed less in operation than ordinary constructions.

The wide open movement of the valve provides a perfectly free discharge at all times. No steam or vapor can enter the return. Its construction guarantees maximum closing pressure, perfect seating and a positively tight valve.

It will not air-bind, water hammer or freeze.

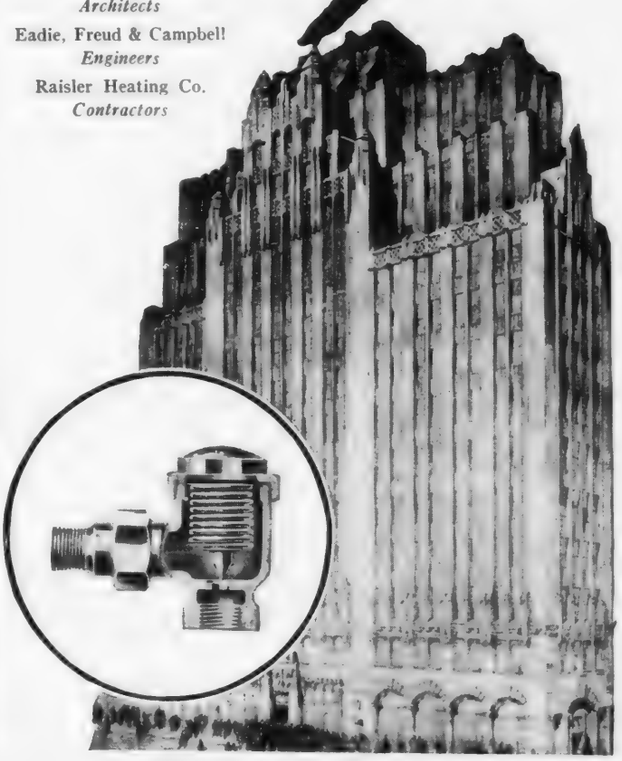
Other advantages are explained in Booklet P-110. Send for a copy.

SARCO CO., Inc.

183 Madison Ave., New York City

Boston Chicago Detroit
Buffalo Cleveland Philadelphia
Pittsburg St. Louis
Peacock Bros., Ltd., Montreal

OFFICE BUILDING
232 Madison Avenue
New York
Polhemus & Coffin
Architects
Eadie, Freud & Campbell
Engineers
Raisler Heating Co.
Contractors



Leaders Use the Best

Chrysler's sixfold increase in production in 3½ years demanded efficient equipment in factory and power plant . . . Mason Regulators are used extensively on the steam and air lines and form an important part of their pressure control equipment.

Mason Standard Reducing Valve

Their accurate, dependable day-in-and-day-out service has made them the choice of plant engineers in every industry . . . they take the guesswork out of pressure control. Write for a copy of Catalog No. 62 which gives a complete description and prices of Mason Regulators for every power and process service.

Mason Regulators

MASON REGULATOR CO.
BOSTON, MASS.

1925

FITZGIBBONS STEEL BOILERS
"The Boiler you can afford to own"

Steel-assured dependability and durability
Advanced scientific design
Extraordinary economy
Compact, brickless construction
Practically no maintenance expense
Proved by forty years of faithful service
Heating Sizes from 300 to 36,000 sq. ft. Steam Rating
Power Sizes from 40 to 350 H. P.

Complete information, ratings and dimensions upon request

FITZGIBBONS BOILER CO.
INCORPORATED
570 Seventh Ave., New York, N. Y.

THERMOSTATIC METAL

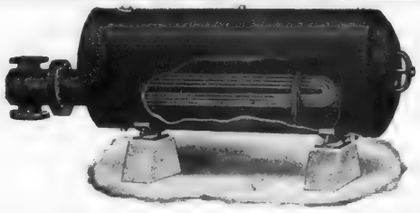
The most accurate, constant and durable of expansion units

FOR LOW AND HIGH TEMPERATURES

Our No. 1800 metal for temperatures below 450° F.
Our No. 2600 metal for temperatures below 1500° F.
Other High Heat Metals for special uses.

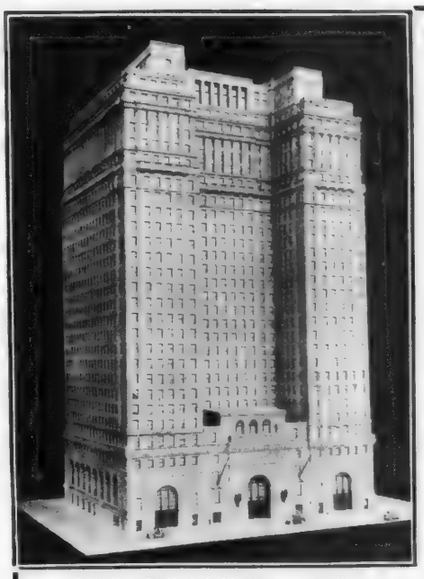
Positive and Dependable Thermostatic Metals

W. M. CHACE VALVE COMPANY
1600 Beard Avenue
Detroit, Michigan



O. E. F. U-Tube and Straight Tube heaters of flange steel make for durability—recognized by leading heating engineers.
Our engineering department is at your service and will assist you in selecting the proper sizes for various types of buildings.

O. E. Frank Heater & Engineering Co., Inc.
Factory and Offices at Buffalo, N. Y.



Fidelity-Philadelphia Trust Building
(From Photograph of Architect's Model)
Simon & Simon, Architects — *Irwin & Leighton, Builders*
Wm. M. Anderson, Plumbing Contractor

Hot Water Equipment
3 Whitlock Type K Heaters

Banking Zone: 1—42" x 120" 1500 gallons per hour
Middle Zone: 1—42" x 144" 2000 gallons per hour
Upper Zone: 1—42" x 168" 2400 gallons per hour

4900 Gallons of Hot Water per Hour!

That's lots of Hot Water . . . but lots of hot water is required in such a large building as the new Fidelity-Philadelphia Trust Building . . . and the heaters must be of sufficient capacity to take care of the peak demand. Whitlock Hot Water Engineers, through long experience, backed by technical training, are qualified to consult with you on the hot water requirements of any building which you may be planning. Whitlock equipment will always furnish plenty of hot water up to rated capacity.

WHITLOCK HEAT TRANSFER PRODUCTS

THE WHITLOCK COIL PIPE CO.
40 South St., Hartford, Conn.

New York, Boston, Philadelphia, Chicago, Baltimore, Detroit, Los Angeles, San Francisco and other principal cities.

Consult Telephone Directory

Wiley

Safety-Vent Vapor Regulator

POWER IS ITS MIDDLE NAME

Makes any Vapor or Modulating System safe and satisfactory. Sensitive to the slightest change in pressure. Has ample power to control the dampers with a good working margin.

Full power of regulator is exerted within a pressure range of two or three ounces.

The Safety Vent Valve is a distinguishing feature of this regulator and takes care of air from entire heating system.

Tested and carefully adjusted before leaving factory, ready to be connected up and put into service, with the least trouble and expense.

All working parts of cast bronze. Will last as long as the boiler, or any other part of system.

Write for details

SIMPLEX HEATING SPECIALTY COMPANY, Inc.
LYNCHBURG, VA.

What Size or Type of Heater?

FROM the largest to the smallest, National will design and fabricate heat transfer apparatus exactly suited to your needs. We offer construction features which add efficiency and longer life; we give you the benefit of our 44 years of experience on installations of common or most difficult nature.

Your particular problem will be handled by National engineers, in a modern plant with every facility, guaranteeing complete satisfaction.

Specialists in

FEED WATER HEATERS
OIL HEATERS OR COOLERS
AIR COOLERS
EVAPORATORS

Write for a National engineer to call and go over the job with you. We will send a bulletin describing National Heaters on request.

Note the size and rugged construction of this National Fuel Oil Heater. It is built to last a lifetime.

NATIONAL

HEAT TRANSFER APPARATUS

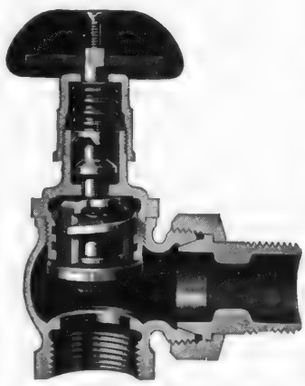
The National Pipe Bending Co.

120 River Street *Established 1883* **New Haven, Conn.**
BOSTON NEW YORK PHILADELPHIA

CAPITOL

STA-PAK VALVES

Never Require Repacking



Send for catalog of complete line of Capitol valves.

ONCE installed, the STA-PAK requires no further attention. No repacking is ever necessary.

It has a very high lift; one turn of the mushroom handle opens or closes it.

Union nut is made of forged brass which provides double the tensile strength of the ordinary cast brass nut.

Manufactured of tested materials. STA-PAK Valves are quality products that will appeal to both the heating engineer and his customer. STA-PAK Valves are offered at attractive prices.

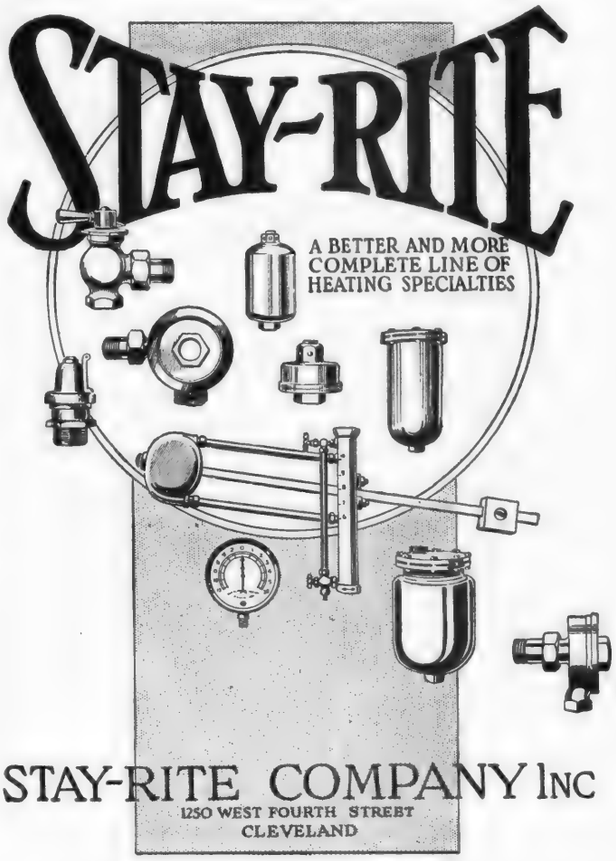
CAPITOL BRASS WORKS

Division of Michigan Smelting and Refining Co.

MANUFACTURERS OF BRASS VALVES, BOILER TRIMMINGS AND PLUMBERS' BRASS GOODS

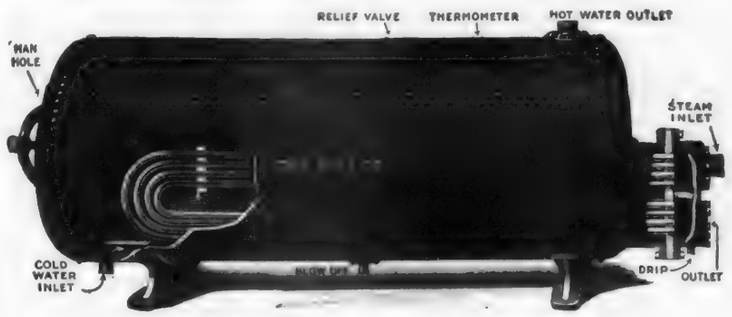
DETROIT, MICH.

STAY-RITE



STAY-RITE COMPANY INC

1250 WEST FOURTH STREET
CLEVELAND



"We keep others in Hot Water"

SIMS

Storage type water heaters are furnished with "U" tubes as illustrated, or with straight tubes and floating head, as may be desired or specified.

SIMS

Water tube heaters and Converters are also constructed with either straight or "U" tubes.

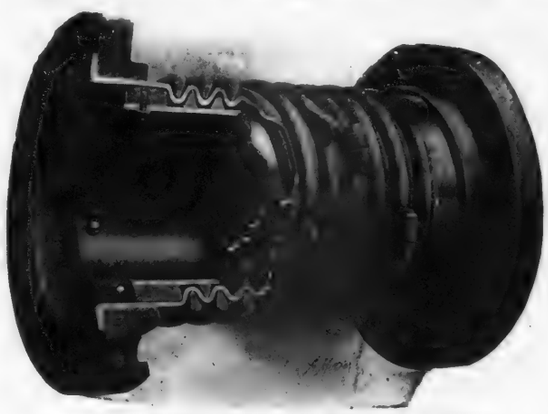
All heaters are produced complete in our plant. They are not an assembly of parts built by others.

THE SIMS COMPANY, P. O. Box 700 Erie, Penna.

Wainwright Expansion Joints for Your Pipe Lines

Wainwright expansion joints are used to take up the expansion in pipe lines carrying steam, hot water or oil.

The Wainwright joint has no packing, expansion being taken up by the corrugated copper cylinder. Inside and outside equalizing rings distribute the movement easily over the many corrugations. An inside protecting sleeve permits passage of steam or liquid without turbulence or danger of erosion to the copper expansion members.



Wainwright Improved Expansion Joint

The larger sizes have an expansion up to 2". The joints up to 14" in diameter are built for any pressure up to 150 lb. per sq. in.; those from 16 to 24 inches, inclusive, up to 125 lb. per sq. in.

Many years of specializing in difficult pipe work insure satisfactory results

FOSTER WHEELER CORPORATION

165 Broadway, New York, N. Y.

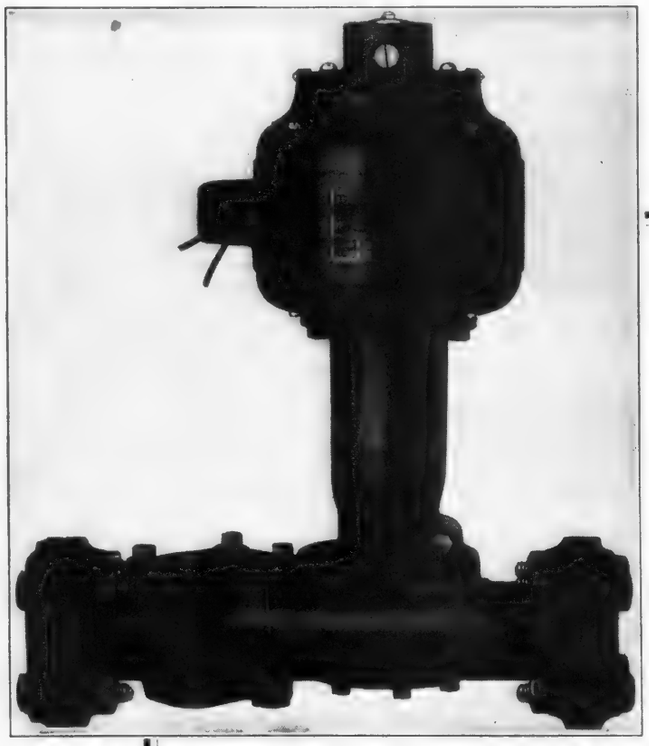
Branches in Principal Cities

Foreign Associates:
Foster Wheeler Limited; London, England.
Foster Wheeler Limited; Toronto-Montreal-Vancouver, Canada

AERO UNIT COAL PULVERIZING
AIR HEATERS CENTRIFUGAL PUMPS
CONDENSERS COOLING TOWERS
ECONOMIZERS EVAPORATORS
EXPANSION JOINTS FEED WATER HEATERS

FOSTER WHEELER

FRACTIONATING TOWERS HEAT EXCHANGERS
STEAM JET AIR PUMPS SUPERHEATERS
TUBE STILLS VACUUM PUMPS
WATER COOLED FURNACE SURFACES
BRASS AND COPPER TUBING AND PIPE



The HYDROLATOR is quiet and efficient. Speeds up circulation. Low operating cost.

The HYDROLATOR

Reg. U. S. Pat. Office.

NOW Is the Time to Cure "Sick" Hot Water Systems

NOW, while the weather is warm, is the time to install the HYDROLATOR. Next winter your customers will appreciate your service in making their homes warmer and their fuel bills lower. The HYDROLATOR eliminates sluggish circulation, "short circuits," traps and inefficiency.

Write for your copy of "The Preventive and the Cure for 'Sick' Hot Water Systems"

Janette Manufacturing Company
556-58 West Monroe Street
Chicago

Singer Bldg., 149 Broadway, New York. | Harrison Sales Co., Seattle, Portland, Spokane. | Real Estate Trust Bldg., Philadelphia.

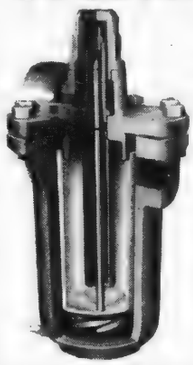
HARTMANN
RADIATOR BRACKETS

THREE STYLES
AR NR NV

Write for Descriptive Circular and Price List

CHARLES HARTMANN CO.
975-993 Dean Street BROOKLYN, N. Y.

Trerice Steam Trap



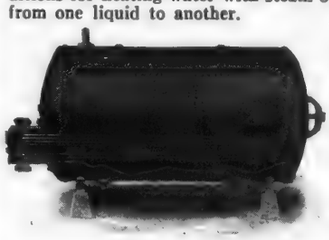
Revolving valve, cleans seat and produces uniform wear on same.
Stainless steel valve and seat.
Sent anywhere for free trial.
Some good territory still available. Liberal contracts. Stock sent on consignment.

Write for full particulars to

H. O. TRERICE COMPANY
1338 West Lafayette Blvd.
Detroit, Michigan

Alberger Buffalo Heaters

are built for a great variety of standard and special operating conditions for heating water with steam or for the interchange of heat from one liquid to another.



Instantaneous Heaters
Storage Heaters
Swimming Pool Heaters
Economizers
Coolers
Heat Interchangers

ALBERGER HEATER CO. 285 Chicago St.
HOWARD IRON WORKS Buffalo, N. Y.

Gone

are the days when summer sales were low. The Preferred 100% Automatic Damper boosts your summer profits.

The oil burner owner wants the Preferred 100% Automatic Damper because it will save 10% to 25% on his fuel cost—you want it for the profit it gives you on every new installation of yours—you also want it to sell to every oil burner owner who is not now equipped with one.

Let your oil burners do full justice to themselves and to you.

Do not let fuel dollars fly up the flue—Let your burners show their greatest economy by using the Preferred 100% Automatic Dampers.

Listed as Standard by Underwriters Laboratories

Patents Applied For

Preferred utilities are preferred because they are practical in performance and price. They are designed and manufactured for the oil burning industry by oil burning engineers who have been in the oil burning field for years.

Preferred Utilities:

PREFERRED 100% AUTOMATIC DAMPER
PREFERRED FOOT VALVES
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PREFERRED DOUBLE TAPPED BUSHINGS
PREFERRED FLUSH BOXES
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Other Preferred Utilities are in our laboratory and on test in the field.

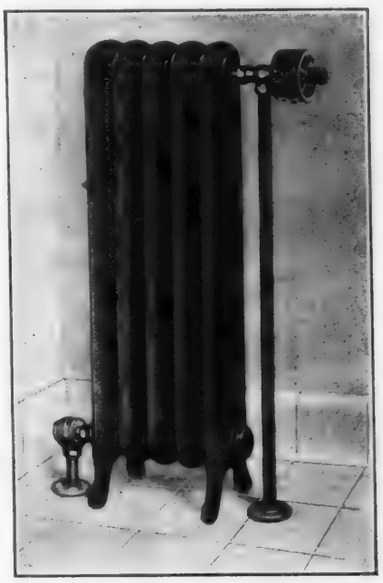
Exclusive Distributors for Absolute Con-Tac-Tor Corp., in New England, New York and Northern New Jersey. Complete stock carried in New York City.

PREFERRED UTILITIES MANUFACTURING CORP.
33 West 60th St., New York, N. Y.

Sterlco
TRADE MARK

ROYS THERMOTROL

"LET THEM REGULATE their Own Temperature"



Installed as Easily as an Ordinary Radiator Valve

OWNERS and BUILDERS! Put an end to heat complaints from tenants. Some require more heat than others. Satisfy them all by installing Sterlco Roys Thermostatic Temperature Regulators directly to the radiators and let them regulate their own temperature. A turn of the knob marked HOT, NORMAL and COLD regulates the temperature to any individual requirement.

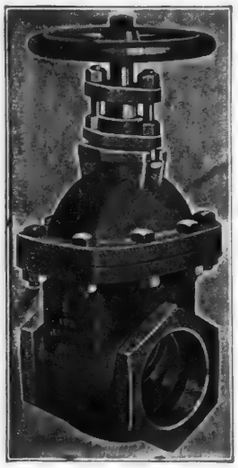
Self-Contained Thermostatic Temperature Regulator

This device is not operated by compressed air or electrical connections, but is directly connected to the radiator. It is actuated by the temperature of the air that surrounds it and can be regulated to govern the temperature of the room.

Write for descriptive booklet No. 40

Sterling Engineering Company
1640 Holton Street **Milwaukee, Wis.**

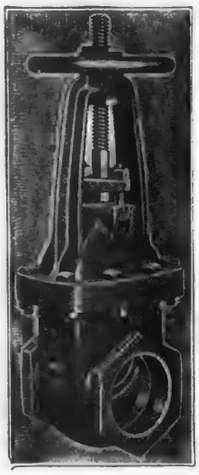
IRON BODY GATE VALVES



SCREWED, FLANGED
AND
HUB END STYLES

NON-RISING STEM
AND
O. S. and Y. PATTERNS

ALSO MANUFACTURERS OF
Cast and Malleable Iron Fittings



Illinois Malleable Iron Company

1801 Diversey Parkway :-: :-: Chicago, Ill.

NO FORCED DRAFT

burns No. 1 Buckwheat

Breaking the Record for Low Coal Bills and Efficiency!

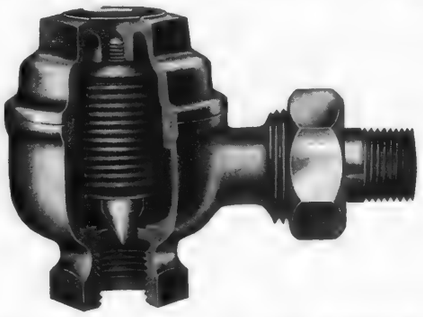
Low pressure steam and hot water heating boilers and tank heaters that burn No. 1 Buckwheat . . . . . No mixing with expensive coal . . . . . Magazine needs filling only once in 12 to 24 hours . . . . . No blower. No motor. No electric current. No machinery to get out of order . . . . . Twenty-one sizes . . . . . *Coal bills cut one half!*

Have you our Catalog and Price Sheets?

The **MOLBY**
HEATING BOILER
and **Heavy Duty Tank Heater**

MOLBY BOILER COMPANY
(Subsidiary of The Universal Pipe and Radiator Company)
New York: Graybar Building, 420 Lexington Ave.
Landsdale, Pa.: 41 Central Ave.

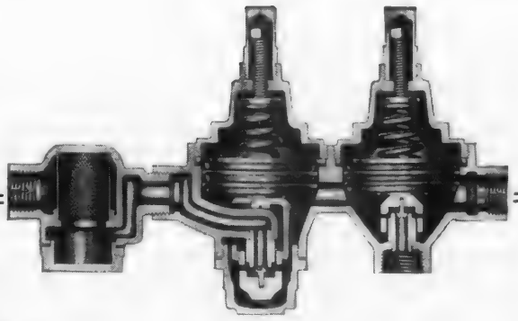
THE No. 3 THERMOFLEX-HYDRON ANGLE RADIATOR TRAP



The Hydron Bellows is the only **hydraulically formed proof-tested** bellows used in thermostatic radiator traps today. Each and every bellows is subjected to several hundred pounds, internal hydraulic pressure in the making. Weak, uneven, or defective metal **will not** make a Thermoflex-Hydron Bellows.

Our new complete catalog No. 52 is now ready for delivery. Gladly mailed upon request.

W. D. CASHIN COMPANY
35 Hartford Street **Boston, Mass.**



The KAINER PRESSURE GOVERNOR

For Hot Water Heating Systems—Eliminates Tank and Fittings

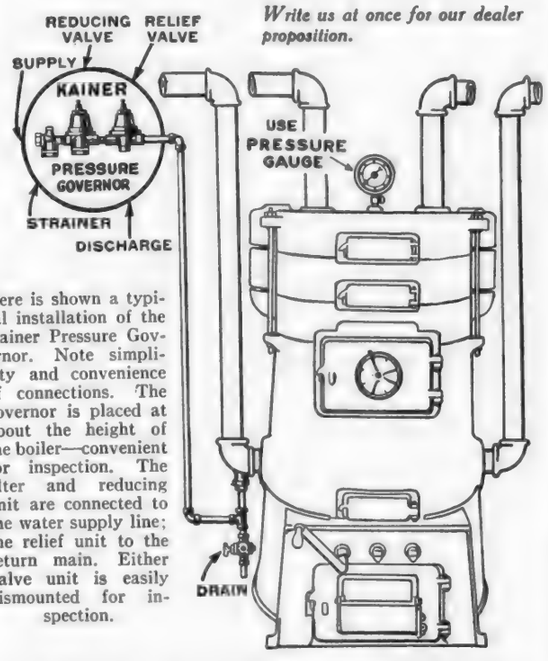
Rust proof - scale proof. Permits full flow of water without any restriction —no water hammer.

Valve body construction entirely of bronze.

Removable seats. Adjustment screws concealed beneath removable bonnets.

Guaranteed satisfaction

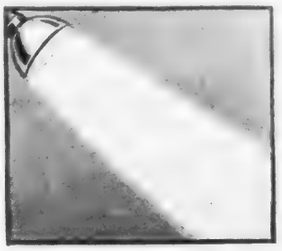
Write us at once for our dealer proposition.



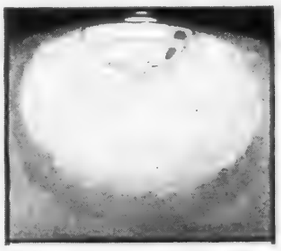
Here is shown a typical installation of the Kainer Pressure Governor. Note simplicity and convenience of connections. The governor is placed at about the height of the boiler—convenient for inspection. The filter and reducing unit are connected to the water supply line; the relief unit to the return main. Either valve unit is easily dismounted for inspection.

KAINER & COMPANY
CHICAGO
761-763 Mather Street
Manufacturers of
Plumbing and Heating Specialties

No "Spotlight" Or Scorched Air Heating With Clow Gasteam Radiators

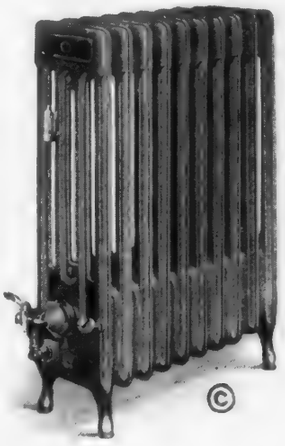


A spotlight. The way some heating fixtures operate. Fierce heat on spot. Cold areas elsewhere.



A diffused office light. Illustrates the way Clow Gasteam Radiators *radiate* heat. Rays are thrown to every part. All areas within a reasonable distance are equally heated.

The way Clow Gasteam Radiators give off heat. They don't hug heat to one small scorched area or throw it on one spot.



A spotlight is all right for certain purposes. But you can't make a room comfortable with "spotlight" heating.

Another point: heating a small volume of air to very high temperatures—scorched air heating—results not only in very faulty heat distribution, but the quality of air in which human beings must live is greatly impaired.

There's no spotlight, or scorched air heating with Clow Gasteam. Clow Gasteam means *steam* heat, radiated in every direction—downward, upward and sideways. Clow Gasteam heats a very large volume of air to medium, healthful temperatures.

Heating with Gasteam Radiators doesn't result in frigid zones and torrid zones, both in the same room—at the same time. Floors as well as ceilings are warm—the farthest corner as comfortably warm as next to the radiator—when rooms are heated with healthful, comfortable Clow Gasteam Radiators.

JAMES B. CLOW & SONS
201-299 No. Talman Ave., CHICAGO

CLOW GASTEAM

ENGINEERS' SPECIFICATION INDEX

ACID FUME EXHAUSTERS
Duriron Company, Inc., The, Dayton, O.

AIR COMPRESSORS
American Steam Pump Co., Battle Creek, Mich.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Economy Pumping Machinery Co., Chicago, Ill.
Garden City Fan Co., Chicago, Ill.
Janette Mfg. Co., Chicago, Ill.
Johnson Service Co., Milwaukee, Wis.
Nash Engineering Co., So. Norwalk, Conn.
Powers Regulator Co., Chicago, Ill.

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Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Carrier Engineering Corp., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Grinnell Co., Providence, R. I.
Heat Transfer Products, Inc., New York
Johnson Service Co., Milwaukee, Wis.
National Air Filter Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park Boston, Mass.
Thermal Units Co., Chicago, Ill.
Typhoon Fan Co., New York.
York Heating & Ventilating Corp., Phila., Pa.

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Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York.
Garden City Fan Co., Chicago, Ill.
General Air Filters Corp., New York.
Johnson Service Co., Milwaukee, Wis.
National Air Filter Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Seymour, James M., Newark, N. J.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Boston, Mass
Thermal Units Co., Chicago, Ill.

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Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Gorton Heating Corporation, New York.
Hoffman Specialty Co., New York.
Marsh & Co., Jas. P., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Sarco Co., Inc., New York.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.

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Connor Co., Inc., The W. B., New York.
DeBothezat Impeller Co., Inc., New York
General Air Filters Corp., New York.
Midwest Air Filters, Inc., Bradford, Pa.
National Air Filter Co., Chicago, Ill.
Reed Air Filter Co., Inc., Louisville, Ky.
Spray Engineering Co., Boston, Mass.
Staynew Filter Corp., Rochester, N. Y.

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Swartwout Co., The, Cleveland, Ohio.
Western Engineering Co., San Francisco, Calif.

AIR WASHERS
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Badger & Sons Co., E. B., Boston, Mass.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
New York Blower Co., Chicago, Ill.
Spray Engineering Co., Boston, Mass.

BELTING
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BLOWERS, FAN
(See Fans, Supply & Exhaust).

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Bayley Blower Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
DeBothezat Impeller Co., Inc., New York
Garden City Fan Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.

BLOWERS, ROTARY
Wing Mfg. Co., L. J., New York.

BLOWERS, TURBINE
Buffalo Forge Co., Buffalo, N. Y
Garden City Fan Co., Chicago, Ill.
Wing Mfg. Co., L. J., New York.

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Johns-Manville Corp., New York.

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Brownell Co., The, Dayton, Ohio.
Fitzgibbons Boiler Co., Inc., New York.
Kewanee Boiler Corp., Kewanee, Ill.
Leader Iron Works, Decatur, Ill.
Moby Boiler Co., New York.
National Radiator Corp., Johnstown, Pa
Pacific Steel Boilers Corp., Waukegan, Ill.
Page Boiler Co., Wm. H., New York.
Richmond Radiator Co., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works Co., The, Titusville, Pa.

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American Radiator Co., Buffalo, N. Y.
Frost Mfg. Co., Galesburg, Ill.
Leader Iron Works, Decatur, Ill.
Mears-Kane-Ofeldt, Inc., Philadelphia, Pa.
National Radiator Corp., Johnstown, Pa.
Page Boiler Co., Wm. H., New York.
Richmond Radiator Co., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works Co., The, Titusville, Pa.

BOILERS, HEATING
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Brownell Co., The, Dayton, Ohio.
Bryan Steam Corp., Peru, Ind.
Burnham Boiler Co., Irrington, N. Y.
Coatesville Boiler Works, Coatesville, Pa.
Fitzgibbons Boiler Co., Inc., New York.
Freeman Mfg. Co., Racine, Wis.
Frost Mfg. Co., Galesburg, Ill.
Gorton Heating Corporation, New York.
Heggie-Simplex Boiler Co., Joliet, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
Johnston Brothers, Inc., Ferrysburg, Mich.
Kewanee Boiler Corp., Kewanee, Ill.
Leader Iron Works, Decatur, Ill.
Moby Boiler Co., New York.
Monitor Boiler Co., Philadelphia, Pa.
National Radiator Corp., Johnstown, Pa.
Newport Boiler Co., Chicago, Ill.
Orr & Sembower, Inc., Reading, Pa.
Pacific Steel Boilers Corp., Waukegan, Ill.
Page Boiler Co., Wm. H., New York.
Peerless Heater Co., Boyertown, Pa.
Pierce, Butler & Pierce Mfg. Corp., New York.
Richmond Radiator Co., New York.
Spencer Heater Co., Williamsport, Pa.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works Co., The, Titusville, Pa.
United States Radiator Corp., Detroit, Mich.
Weil-McLain Co., Chicago, Ill.

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Moby Boiler Co., New York.
Newport Boiler Co., Chicago, Ill.
Spencer Heater Co., Williamsport, Pa.

BOILERS, OIL-FIRED
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Johnston Brothers, Inc., Ferrysburg, Mich
Leader Iron Works, Decatur, Ill.

BOILERS, POWER
Fitzgibbons Boiler Co., Inc., New York.
Frost Mfg. Co., Galesburg, Ill.
Heggie-Simplex Boiler Co., Joliet, Ill.
Kewanee Boiler Corp., Kewanee, Ill.
Orr & Sembower, Inc., Reading, Pa.
Pierce, Butler & Pierce Mfg. Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works Co., The, Titusville, Pa.

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Clow & Sons, James B., Chicago, Ill.
Heat Transfer Products, Inc., New York
National Pipe Bending Co., New Haven, Conn.
Walworth Co., New York
Whitlock Coil Pipe Co., Hartford, Conn.

CONDENSERS
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Foster Wheeler Corporation, Carteret, N. J.
Frank Heater & Engineering Co., O. E., Buffalo, N. Y.
Heat Transfer Products, Inc., New York
National Pipe Bending Co., New Haven, Conn.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Whitlock Coil Pipe Co., Hartford, Conn.

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Frank Heater & Engineering Co., O. E., Buffalo, N. Y.
National Pipe Bending Co., New Haven, Conn.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Whitlock Coil Pipe Co., Hartford, Conn.

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Frank Heater & Engineering Co., O. E., Buffalo, N. Y.

COOLERS, OIL
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National Pipe Bending Co., New Haven, Conn.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Spray Engineering Co., Boston, Mass.
Whitlock Coil Pipe Co., Hartford, Conn.

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Buffalo Forge Co., Buffalo, N. Y.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Spray Engineering Co., Boston, Mass.

COPPER BOILERS
Badger & Sons Co., E. B., Boston, Mass.

COPPER KETTLES
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Banner Rock Products Co., Alexandria, Ind.
Johns-Manville Corp., New York.
Ric-wiL Co., The, Cleveland, Ohio.
Wyckoff & Son Co., A., Elmira, N. Y.

DAMPERS, DUCT
Buckeye Blower Co., The, Columbus, Ohio.
Clarage Fan Co., Kalamazoo, Mich.
Pecco, Inc., St. Louis, Mo.

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Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Heat Transfer Products, Inc., New York
Johnson Service Co., Milwaukee, Wis.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.
York Heating & Ventilating Corp., Phila., Pa.

DISTILLERS, (WATER)
Badger & Sons Co., E. B., Boston, Mass.
Davis Engineering Corp., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.

DRAFT APPLIANCES
International Fuel Service Corp., Bridgeport, Conn.

DRYING SYSTEMS
(See Air Cooling & Drying Systems).

DUST COLLECTING SYSTEMS
American Blower Co., Detroit, Mich
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York.
Garden City Fan Co., Chicago, Ill.
General Air Filters Corp., New York.
Midwest Air Filters, Inc., Bradford, Pa
Pecco, Inc., St. Louis, Mo.
Reed Air Filter Co., Inc., Louisville, Ky.
Skinner Bros. Mfg. Co., St. Louis, Mo.

DUST COLLECTORS
American Blower Co., Detroit, Mich.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Connor Co., Inc., The W. B., New York.
Garden City Fan Co., Chicago, Ill.
General Air Filters Corp., New York.
Pecco, Inc., St. Louis, Mo.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
York Heating & Ventilating Corp., Phila., Pa.

ENGINES, STEAM, AUTOMATIC
American Blower Co., Detroit, Mich.
Brownell Co., The, Dayton, Ohio.
Clarage Fan Co., Kalamazoo, Mich.
Frost Mfg. Co., Galesburg, Ill.
Pierce, Butler & Pierce Mfg. Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

ENGINES, STEAM, HIGH SPEED
American Blower Co., Detroit, Mich.
Brownell Co., The, Dayton, Ohio.
Clarage Fan Co., Kalamazoo, Mich.
Frost Mfg. Co., Galesburg, Ill.
Pierce, Butler & Pierce Mfg. Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.

EQUALIZING LOOPS
Hoffman Specialty Co., New York.
Sarco Co., Inc., New York.

EVAPORATORS, BOILER FEED MAKE-UP
Buffalo Forge Co., Buffalo, N. Y.
Davis Engineering Corp., New York.
National Pipe Bending Co., New Haven, Conn.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.

EXHAUST HEADS
Aeolus Dickinson Co., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Skinner Bros. Mfg. Co., St. Louis, Mo
Sturtevant Co., B. F., Hyde Park Boston, Mass.
Swartwout Co., The, Cleveland, Ohio

EXHAUST SYSTEMS
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Garden City Fan Co., Chicago, Ill.
Skinner Bros. Mfg. Co., St. Louis, Mo
Sturtevant Co., B. F., Hyde Park Boston, Mass

EXHAUST SYSTEMS, ACID
Duriron Company, Inc., The, Dayton, O.

EXPANSION JOINTS
Alberger Heater Co., Buffalo, N. Y.
American District Steam Co., North Tonawanda, N. Y.
Badger & Sons Co., E. B., Boston, Mass.
Central Station Steam Co., Detroit, Mich.
Foster Wheeler Corporation, Carteret, N. J.
Fulton Syphon Co., Knoxville, Tenn.
Gradon Mfg. Co., Philadelphia, Pa.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill
Ross Heater & Mfg. Co., Buffalo, N. Y.
Walworth Co., New York
Webster & Co., Warren, Camden, N. J

EXPANSION SHELLS
Phillips Drill Co., Chicago, Ill.

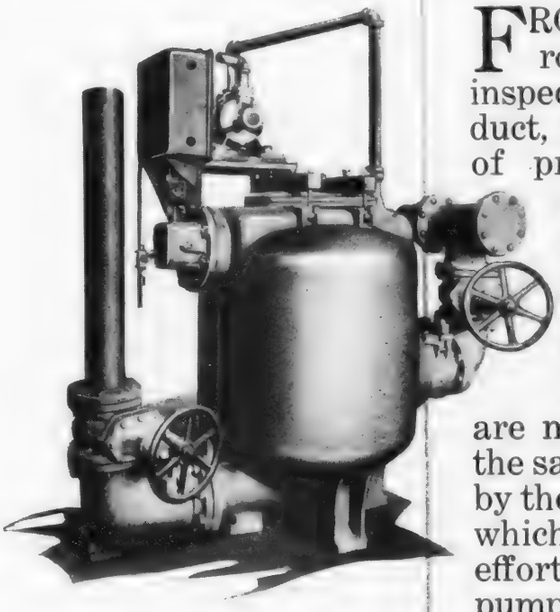
FANS, ACID RESISTING
Duriron Company, Inc., The, Dayton, O.

FANS, DISC PRESSURE
DeBothezat Impeller Co., Inc., New York.
Garden City Fan Co., Chicago, Ill.

FANS, SUPPLY AND EXHAUST
American Blower Co., Detroit, Mich
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
DeBothezat Impeller Co., Inc., New York
Emerson Electric Mfg. Co., St. Louis, Mo.
Garden City Fan Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Seymour, James M., Newark, N. J.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Typhoon Fan Co., New York.
Wing Mfg. Co., L. J., New York.

FEEDERS, BOILER
Cashin Co., W. D., Boston, Mass.
Cissell Mfg. Co., W. M., Louisville, Ky
Connor Co., Inc., The W. B., New York
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
McDonnell & Miller, Chicago, Ill.

Made by the makers of Jennings heating pumps



The Jennings Sewage Ejector, complete with compressor. Supplied in standard capacities to 1500 g.p.m. Heads to 50 ft.

Bulletin 67 is the one to write for.

FROM the initial test of the rough castings to the final inspection of the assembled product, the same exacting methods of precision manufacture that have identified the construction of the Jennings Heating Pump are to be noted in the Jennings Sewage Ejector.

Jennings Sewage Ejectors are made in the same plant, by the same organization. Developed by the Jennings engineering staff which devotes its entire time and effort to the design of high grade pumps exclusively, Jennings Sewage Ejectors can be depended on in the several services for which they are built.

Architects and engineers, who during the past nineteen years have specified and recommended the Jennings Heating Pump for the 30,000 and more buildings in which they are installed, can with equal confidence rely on the Jennings Sewage Ejector for pumping unscreened sewage or drainage from basements below the street sewer level, handling crude sewage from low level districts, pumping effluent, sludge and other heavy liquids.

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Jennings Pumps

Schutte & Koerting Co., Philadelphia, Pa.
Walworth Co., New York.

FILTERS, (AERATING)
Davis Engineering Corp., New York.

FILTERS, FEED-WATER
Davis Engineering Corp., New York.

FITTINGS, ACID RESISTING
Duriron Company, Inc., The, Dayton, O.

FITTINGS, DISTRIBUTOR
Blake Specialty Co., Rock Island, Ill.

FITTINGS, FLANGED
Clow & Sons, James B., Chicago, Ill.
Grinnell Co., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Walworth Co., New York

FLANGES
Clow & Sons, James B., Chicago, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Walworth Co., New York

GAS BURNERS
Cleveland Gas Burner & Appliance Co., Cleveland, Ohio.

GASKETS, ASBESTOS
Jenkins Bros., New York.
Johns-Manville Corp., New York.

GASKETS, METALLIC
Jenkins Bros., New York.

GASKETS, RUBBER
Jenkins Bros., New York.

GAUGE BOARDS
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Clow & Sons, James B., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.

GAUGE GLASSES
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Jenkins Bros., New York.

GAUGES, ALTITUDE
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Mercoid Corporation, Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Pierce, Butler & Pierce Mfg. Corp., New York.
United States Radiator Corp., Detroit, Mich.

GAUGES, DRAFT
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.

GAUGES, HYDRAULIC
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.

GAUGES, OUNCE GRADUATED
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Dunham Co., C. A., Chicago, Ill.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
United States Radiator Corp., Detroit, Mich.

GAUGES, PRESSURE
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Dunham Co., C. A., Chicago, Ill.
Foxboro Co., Inc., The, Foxboro, Mass.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Pierce, Butler & Pierce Mfg. Corp., New York.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
United States Radiator Corp., Detroit, Mich.

GAUGES, VACUUM
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Dunham Co., C. A., Chicago, Ill.
Foxboro Co., Inc., The, Foxboro, Mass.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Stay-Rite Co., Inc., Cleveland, Ohio.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
United States Radiator Corp., Detroit, Mich.
Webster & Co., Warren, Camden, N. J.

GAUGES, VACUUM (COMPOUND)
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Foxboro Co., Inc., The, Foxboro, Mass.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Pierce, Butler & Pierce Mfg. Corp., New York.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
United States Radiator Corp., Detroit, Mich.
Webster & Co., Warren, Camden, N. J.

GAUGES, WATER
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Mercoid Corporation, Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Walworth Co., New York

GENERATOR COOLING SYSTEMS
American Blower Co., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Reed Air Filter Co., Inc., Louisville, Ky.
Schutte & Koerting Co., Philadelphia, Pa.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

GOVERNORS, (PUMP)
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
Webster & Co., Warren, Camden, N. J.

GRATES, DUMPING
Fitzgibbons Boiler Co., Inc., New York.
Kewanee Boiler Corp., Kewanee, Ill.
Pyramid Iron Products Corp., New York.
Stanwood Corporation, Cincinnati, Ohio
Titusville Iron Works Co., The, Titusville, Pa

GRATES, ROCKING
Kewanee Boiler Corp., Kewanee, Ill.
Page Boiler Co., Wm. H., New York.
Pyramid Iron Products Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.

GRATES, SHAKING
Fitzgibbons Boiler Co., Inc., New York.
Kewanee Boiler Corp., Kewanee, Ill.
Page Boiler Co., Wm. H., New York.
Pyramid Iron Products Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works Co., The, Titusville, Pa.

GRATES, SHAKING AND DUMPING
Frost Mfg. Co., Galesburg, Ill.
Kewanee Boiler Corp., Kewanee, Ill.
Pyramid Iron Products Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works Co., The, Titusville, Pa.

GRATES, SHAKING, CIRCULAR
Fitzgibbons Boiler Co., Inc., New York.
Pyramid Iron Products Corp., New York
Titusville Iron Works Co., The, Titusville, Pa.

GRATES, STATIONARY
Fitzgibbons Boiler Co., Inc., New York.
Frost Mfg. Co., Galesburg, Ill.
Pyramid Iron Products Corp., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works Co., The, Titusville, Pa.

GRILLES
Metalace Corporation, Boston, Mass.

HEAT CABINETS
Clow & Sons, James B., Chicago, Ill.
McQuay Radiator Corp., Chicago, Ill.
Metal Stamping Co., Long Island City.
Modine Mfg. Co., Racine, Wis.
Nelson Corp., Herman, The, Moline, Ill.
Reed Air Filter Co., Inc., Louisville, Ky.
Thermal Units Co., Chicago, Ill.
Trane Co., The, LaCrosse, Wis.

HEATERS, AIR, FAN SYSTEM
Aerofin Corp., Newark, N. J.
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Dwyer Equipment Co., Chicago, Ill.
Garden City Fan Co., Chicago, Ill.
Modine Mfg. Co., Racine, Wis.
National Air Filter Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Rome-Turney Radiator Co., Rome, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Thermal Units Co., Chicago, Ill.
Trane Co., The, LaCrosse, Wis.
Wing Mfg. Co., L. J., New York.

HEATERS, DOMESTIC WATER
Alberger Heater Co., Buffalo, N. Y.
American District Steam Co., North Tonawanda, N. Y.
American Radiator Co., Buffalo, N. Y.
Blake Specialty Co., Rock Island, Ill.
Davis Engineering Corp., New York.
Excelso Products Corporation, Buffalo, N. Y.
Frank Heater & Engineering Co., O. E., Buffalo, N. Y.
Illinois Malleable Iron Co., Chicago, Ill.
Kewanee Boiler Corp., Kewanee, Ill.
Leader Iron Works, Decatur, Ill.
Mears-Kane-Ofeldt, Inc., Philadelphia, Pa.
Molby Boiler Co., New York.
Monitor Boiler Co., Philadelphia, Pa.
National Pipe Bending Co., New Haven, Conn.
Page Boiler Co., Wm. H., New York.
Patterson-Kelley Co., New York.
Pierce, Butler & Pierce Mfg. Corp., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Sims Co., The, Erie, Pa.
Taco Heaters, Inc., New York.
Titusville Iron Works Co., The, Titusville, Pa.
United States Radiator Corp., Detroit, Mich.
Weil-McLain Co., Chicago, Ill.
Whitlock Coil Pipe Co., Hartford, Conn.

HEATERS, ELECTRICAL UNIT
American Blower Co., Detroit, Mich.

HEATERS, FEED WATER, (CLOSED)
Alberger Heater Co., Buffalo, N. Y.
Davis Engineering Corp., New York.
Foster Wheeler Corporation, Carteret, N. J.
Frank Heater & Engineering Co., O. E., Buffalo, N. Y.
Frost Mfg. Co., Galesburg, Ill.
Gradon Mfg. Co., Philadelphia, Pa.
Illinois Malleable Iron Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Sims Co., The, Erie, Pa.
Stanwood Corporation, Cincinnati, Ohio
Whitlock Coil Pipe Co., Hartford, Conn.

HEATERS, FEED WATER, (OPEN)
Frost Mfg. Co., Galesburg, Ill.
National Pipe Bending Co., New Haven, Conn.
Sims Co., The, Erie, Pa.
Stanwood Corporation, Cincinnati, Ohio.
Webster & Co., Warren, Camden, N. J.

HEATERS, FUEL-OIL
Alberger Heater Co., Buffalo, N. Y.
Davis Engineering Corp., New York.
Electrol, Inc., St. Louis, Mo.
Excelso Products Corporation, Buffalo, N. Y.
Frank Heater & Engineering Co., O. E., Buffalo, N. Y.
Heat Transfer Products, Inc., New York
National Air Filter Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Schutte & Koerting Co., Philadelphia, Pa.
Taco Heaters, Inc., New York.
Titusville Iron Works Co., The, Titusville, Pa.
Whitlock Coil Pipe Co., Hartford, Conn.

HEATERS, UNIT
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Dwyer Equipment Co., Chicago, Ill.
Garden City Fan Co., Chicago, Ill.
McQuay Radiator Corp., Chicago, Ill.
Modine Mfg. Co., Racine, Wis.
Nelson Corp., Herman, The, Moline, Ill.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Peerless Unit Ventilation Co., Inc., New York.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Stickle Steam Specialties Co., Indianapolis, Ind.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Thermal Units Co., Chicago, Ill.
Trane Co., The, LaCrosse, Wis.
Typhoon Fan Co., New York.
Wing Mfg. Co., L. J., New York.
York Heating & Ventilating Corp., Phila., Pa.

HEATING SYSTEMS, GAS
Clow & Sons, James B., Chicago, Ill.

HEATING SYSTEMS, VACUUM
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Sarco Co., Inc., New York.
Spencer Heater Co., Williamsport, Pa.
Stay-Rite Co., Inc., Cleveland, Ohio.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Webster & Co., Warren, Camden, N. J.

HEATING SYSTEMS, VAPOR
American District Steam Co., North Tonawanda, N. Y.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Gorton Heating Corporation, New York.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Page Boiler Co., Wm. H., New York.
Sarco Co., Inc., New York.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Spencer Heater Co., Williamsport, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Vapor Engineering Co., New York.
Webster & Co., Warren, Camden, N. J

HEATING SYSTEMS, WATER
American Radiator Co., Buffalo, N. Y.
Bishop & Babcock Sales Co., Cleveland Ohio.
Grinnell Co., Providence, R. I.
Hornung, J. C., Chicago, Ill.
Mueller Co., Decatur, Ill.
Page Boiler Co., Wm. H., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Spencer Heater Co., Williamsport, Pa.
Thrush & Co., H. A., Peru, Ind.
United States Radiator Corp., Detroit, Mich.

HUMIDIFIERS
American Blower Co., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Grinnell Co., Providence, R. I.
Heat Transfer Products, Inc., New York
Johnson Service Co., Milwaukee, Wis.
Midwest Air Filters, Inc., Bradford, Pa.
National Air Filter Co., Chicago, Ill.
National Regulator Co., Chicago, Ill.
Seymour, James M., Newark, N. J.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
York Heating & Ventilating Corp., Phila., Pa.

HUMIDITY CONTROL
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Carrier Engineering Corp., Newark, N. J.
Foxboro Co., Inc., The, Foxboro, Mass.
Grinnell Co., Providence, R. I.
Johnson Service Co., Milwaukee, Wis.
National Air Filter Co., Chicago, Ill.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.

INSTRUMENTS, ELECTRIC MEASURING
Bristol Co., The, Waterbury, Conn.

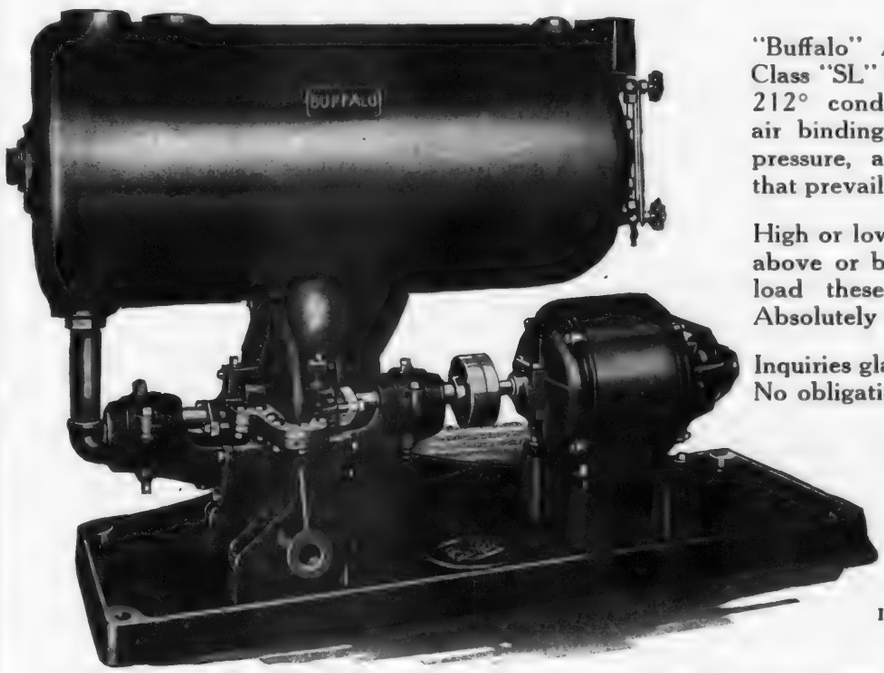
INSTRUMENTS, INDICATING AND RECORDING
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
Mercoid Corporation, Chicago, Ill.

INSULATION, BOILER, PIPE, ETC.
(See Covering, Boiler, Pipe, etc.)

INSULATION, BUILDING
Banner Rock Products Co., Alexandria, Ind.
Flax-li-num Insulating Co., St. Paul, Minn.
Insulite Co., Minneapolis, Minn.
Johns-Manville Corp., New York.

MANOMETERS
American Blower Co., Detroit, Mich.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Foxboro Co., Inc., The, Foxboro, Mass.

"Value-Plus" Condensation Outfits



"Buffalo" Automatic Double Suction Class "SL" Pumps will positively pump 212° condensate without vaporizing, air binding, reduction in capacity or pressure, and various other troubles that prevail in other condensate pumps.

High or low water temperatures, either above or below normal, do not overload these smooth running pumps. Absolutely self-priming.

Inquiries gladly answered. Write today. No obligation.

BUFFALO STEAM PUMP COMPANY
480 Broadway
BUFFALO N. Y.

In Canada—Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo" Pumps for Every Service and Drive

Away Ahead! TEESDALE

Type TU TEESDALE Automatic Pump, capacity 30 gal. per hour, listed as standard by Underwriters' Laboratories. Approved, Board of Standards and Appeals, New York.

Automatic Oil Pumps

STEADILY but surely TEESDALE Automatic Oil Pumps have forged ahead. And today they enjoy a remarkable, yet deserved leadership in the oil pump field.

Profitable, trouble-free service—quiet, dependable and inexpensive operation—simplicity in design and construction: these are primary factors that set TEESDALE "away ahead."

Write today for your proposition. We supply you with attractive sales-producing folders for your prospects.

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Walters Warehouse, 410 W. 52nd St.

Philadelphia Branch:
3931 N. Broad Street

Pacific Coast Warehouse:
Taylor-Edwards Warehouse, Seattle

MECHANICAL DRAFT APPARATUS
American Blower Co., Detroit, Mich.
Bayley Blower Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
DeBothezat Impeller Co., Inc., New York
Garden City Fan Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
New York Blower Co., Chicago, Ill.
Pyramid Iron Products Corp., New York.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.

METALS, THERMOSTATIC
Chace Valve Co., W. M., Detroit, Mich.

METERS, CONDENSATION
American District Steam Co., North Tonawanda, N. Y.
Central Station Steam Co., Detroit, Mich

METERS, FEED WATER
Central Station Steam Co., Detroit, Mich.
Webster & Co., Warren, Camden, N. J.

METERS, FLOW
Foxboro Co., Inc., The, Foxboro, Mass.
Spray Engineering Co., Boston, Mass.

METERS, PITOT TUBE
American Blower Co., Detroit, Mich.
Buffalo Forge Co., Buffalo, N. Y.

METERS, STEAM
American District Steam Co., North Tonawanda, N. Y.
Builders Iron Foundry, Providence, R. I.

MOTORS (ELECTRIC)
Baldor Electric Co., St. Louis, Mo.
Century Electric Co., St. Louis, Mo.
Emerson Electric Mfg. Co., St. Louis, Mo.
Janette Mfg. Co., Chicago, Ill.
Lincoln Electric Co., Cleveland, Ohio.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

NOZZLES, ACID RESISTING
Duriron Company, Inc., The, Dayton, O.

NOZZLES, SPRAY
American Blower Co., Detroit, Mich.
Badger & Sons Co., E. B., Boston, Mass.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Connor Co., Inc., The W. B., New York.
Dunham Co., C. A., Chicago, Ill.
General Air Filters Corp., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

OIL BURNERS
American Nokol Corp., Chicago, Ill.
Automatic Burner Corp., Chicago Ill
Cleveland Steel Products Corp., Cleveland, Ohio
Electrol, Inc., St. Louis, Mo.
Gulf Oil Burner Co., Philadelphia, Pa.
Hardinge Bros., Inc., Chicago, Ill.
Laco Gas Burner Co., Griswold, Iowa.
McIlvaine Burner Corporation, Chicago, Ill.
Nu-Way Corporation, Rock Island, Ill.
Pascoe Company, The Wm. H., Chicago, Ill.
Petroleum Heat & Power Co., New York.
Preferred Oil Burners, Inc., Peoria, Ill.
York Oil Burner Co., York, Pa.

OIL BURNER EQUIPMENT
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
American Steam Pump Co., Battle Creek, Mich.
Buffalo Forge Co., Buffalo, N. Y.
Hornung, J. C., Chicago, Ill.
Janette Mfg. Co., Chicago, Ill.
Johnston Brothers, Inc., Ferrysburg, Mich.
Teesdale Mfg. Co., Grand Rapids, Mich.
Preferred Utilities Mfg. Corp., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Webster Electric Co., Racine, Wis.

OIL BURNER IGNITION AND CONTROL EQUIPMENT
Absolute Con-Tac-Tor Corp., Elkhart, Ind.
McAlear Mfg. Co., Chicago, Ill.
McDonnell & Miller, Chicago, Ill.
Mercoid Corporation, Chicago, Ill.
Webster Electric Co., Racine, Wis.

PIPE, ACID RESISTING
Duriron Company, Inc., The, Dayton, O.

PIPE, CAST IRON
Clow & Sons, James B., Chicago, Ill.

PIPE, STEEL
Clow & Sons, James B., Chicago, Ill.
National Tube Co., Pittsburgh, Pa.

PIPE, WOOD
Wyckoff & Son Co., A., Elmira, N. Y.

PIPE BENDING
Badger & Sons Co., E. B., Boston, Mass.
Clow & Sons, James B., Chicago, Ill.
Grinnell Co., Providence, R. I.
National Pipe Bending Co., New Haven, Conn.
Walworth Co., New York
Whitlock Coil Pipe Co., Hartford, Conn.

PIPE CASING (WOOD)
American District Steam Co., North Tonawanda, N. Y.
Wyckoff & Son Co., A., Elmira, N. Y.

PIPE HANGERS
Clow & Sons, James B., Chicago, Ill.
Grinnell Co., Providence, R. I.
Walworth Co., New York

PIPE THREADING & CUTTING MACHINES
National Pipe Bending Co., New Haven, Conn.

PRESSURE REDUCING VALVES
(See Regulators, Pressure).

PULLEYS, VARIABLE SPEED
Horton Mfg. Co., Minneapolis, Minn.

PUMPS, ACID RESISTING
Duriron Company, Inc., The, Dayton, O.

PUMPS, CENTRIFUGAL
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Foster Wheeler Corporation, Carteret, N. J.
Nash Engineering Co., So. Norwalk, Conn.
Trane Co., The, LaCrosse, Wis.

PUMPS, CENTRIFUGAL, VACUUM HEATING
Ames Pump Co., New York.
Chicago Pump Co., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Skidmore Corp., Chicago, Ill.
Trane Co., The, LaCrosse, Wis.

PUMPS, CONDENSATION
American Steam Pump Co., Battle Creek, Mich.
Ames Pump Co., New York.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Connor Co., Inc., The W. B., New York.
Dunham Co., C. A., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
Weil Pump Co., Chicago, Ill.

PUMPS, OIL
Connor Co., Inc., The W. B., New York.
Janette Mfg. Co., Chicago, Ill.

PUMPS, RECIPROCATING STEAM
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.

PUMPS, SUMP
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Economy Pumping Machinery Co., Chicago, Ill.
Janette Mfg. Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.

PUMPS, TURBINE
Chicago Pump Co., Chicago, Ill.
Foster Wheeler Corporation, Carteret, N. J.
Nash Engineering Co., So. Norwalk, Conn.

PUMPS, VACUUM
American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Janette Mfg. Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Skidmore Corp., Chicago, Ill.
Trane Co., The, LaCrosse, Wis.

RADIATOR ENCLOSURES OR SHIELDS
American Metal Products Corp., St. Louis, Mo.

RADIATOR HANGERS
American Radiator Co., Buffalo, N. Y.
Clow & Sons, James B., Chicago, Ill.
Grinnell Co., Providence, R. I.
Hartmann Co., Charles, Brooklyn, N. Y.
Healy-Ruff Co., St. Paul, Minn.
Kewanee Boiler Corp., Kewanee, Ill.
McAlear Mfg. Co., Chicago, Ill.
United States Radiator Corp., Detroit, Mich.

RADIATORS, BRASS
Rome Brass Radiator Corp., New York.
Shaw-Perkins Mfg. Co., Pittsburgh, Pa.

RADIATORS, GAS HEATED
Clow & Sons, James B., Chicago, Ill.

RADIATORS, STEAM & WATER
American Radiator Co., Buffalo, N. Y.
Clow & Sons, James B., Chicago, Ill.
Kewanee Boiler Corp., Kewanee, Ill.
Moby Boiler Co., New York.
National Radiator Corp., Johnstown, Pa.
Nelson Corp., Herman, The, Moline, Ill.
Page Boiler Co., Wm. H., New York.
Pierce, Butler & Pierce Mfg. Corp., New York.
Richmond Radiator Co., New York.
United States Radiator Corp., Detroit, Mich.

RECEIVERS, AIR
Brownell Co., The, Dayton, Ohio.
Frost Mfg. Co., Galesburg, Ill.
National Pipe Bending Co., New Haven, Conn.
Titusville Iron Works Co., The, Titusville, Pa.
Vapor Engineering Co., New York.
Whitlock Coil Pipe Co., Hartford, Conn.

RECEIVERS, CONDENSATION
American District Steam Co., North Tonawanda, N. Y.
American Steam Pump Co., Battle Creek, Mich.
Connor Co., Inc., The W. B., New York.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Titusville Iron Works Co., The, Titusville, Pa.
Trane Co., The, LaCrosse, Wis.
Vapor Engineering Co., New York.
Whitlock Coil Pipe Co., Hartford, Conn.

REGULATORS, BOILER-FEED
Atlas Valve Co., Newark, N. J.
Cissell Mfg. Co., W. M., Louisville, Ky.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
McDonnell & Miller, Chicago, Ill.

REGULATORS, DAMPER
American District Steam Co., North Tonawanda, N. Y.
American Radiator Co., Buffalo, N. Y.
Atlas Valve Co., Newark, N. J.
Dunham Co., C. A., Chicago, Ill.
Fulton Syphon Co., Knoxville, Tenn.
Gorton Heating Corporation, New York.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Johnson Service Co., Milwaukee, Wis.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
National Regulator Co., Chicago, Ill.
Page Boiler Co., Wm. H., New York.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Stay-Rite Co., Inc., Cleveland, Ohio.
Sterling Engineering Co., Milwaukee, Wis.
Thrush & Co., H. A., Peru, Ind.
Trane Co., The, LaCrosse, Wis.
Wing Mfg. Co., L. J., New York.

REGULATORS, PRESSURE
American District Steam Co., North Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Johnson Service Co., Milwaukee, Wis.
Kainer & Company, Chicago, Ill.
Kieley & Mueller, Inc., New York.
Lytton Mfg. Corp., Franklin, Va.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Mueller Co., Decatur, Ill.
Powers Regulator Co., Chicago, Ill.
Schutte & Koerting Co., Philadelphia, Pa.
Teeple Co., L. R., Portland, Oregon

REGULATORS, TEMPERATURE
(See Temperature Control).

SEPARATORS, OIL
Bishop & Babcock Sales Co., Cleveland, Ohio.
Dunham Co., C. A., Chicago, Ill.
Gradon Mfg. Co., Philadelphia, Pa.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Webster & Co., Warren, Camden, N. J.

SEPARATORS, STEAM
American District Steam Co., North Tonawanda, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Gradon Mfg. Co., Philadelphia, Pa.
Illinois Engineering Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Sims Co., The, Erie, Pa.
Swartwout Co., The, Cleveland, Ohio
Webster & Co., Warren, Camden, N. J

SPRAY COOLING SYSTEMS
Badger & Sons Co., E. B., Boston, Mass.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York
Schutte & Koerting Co., Philadelphia, Pa.
Seymour, James M., Newark, N. J
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

SPRAY NOZZLES
(See Nozzles, Spray).

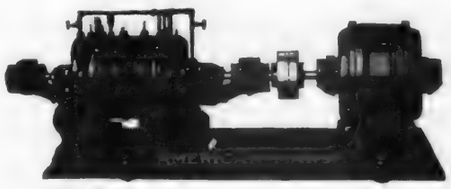
STRAINERS, OIL
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill
Janette Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Sarco Co., Inc., New York.
Schutte & Koerting Co., Philadelphia Pa.

STRAINERS, STEAM
American District Steam Co., North Tonawanda, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Illinois Engineering Co., Chicago, Ill
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis
Sarco Co., Inc., New York.
Schutte & Koerting Co., Philadelphia Pa.

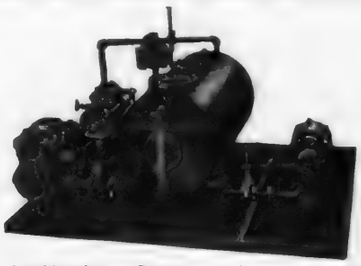
STRAINERS, WATER
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis
Ross Heater & Mfg. Co., Buffalo, N. Y.
Sarco Co., Inc., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Spray Engineering Co., Boston, Mass

TEMPERATURE CONTROL
Absolute Con-Tac-Tor Corp., Elkhart Ind.
American Radiator Co., Buffalo, N. Y
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Carrier Engineering Corp., Newark, N. J.
Foxboro Co., Inc., The, Foxboro, Mass
Fulton Sylphon Co., Knoxville, Tenn
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill
Kieley & Mueller, Inc., New York.
Mercoid Corporation, Chicago, Ill.
National Regulator Co., Chicago, Ill
Powers Regulator Co., Chicago, Ill.
Pyramid Iron Products Corp., New York.
Raymond, F. I., River Forest, Ill.
Sarco Co., Inc., New York.
Sterling Engineering Co., Milwaukee, Wis.
Teeple Co., L. R., Portland, Oregon
Thrush & Co., H. A., Peru, Ind.
Trane Co., The, LaCrosse, Wis.
United States Radiator Corp., Detroit, Mich.

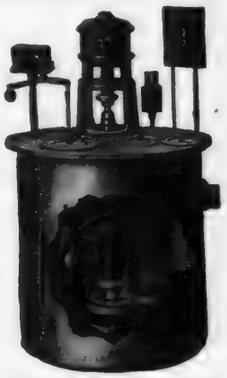
THERMOMETERS, RECORDING & INDICATING
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., The, Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
National Radiator Corp., Johnstown, Pa
Pierce, Butler & Pierce Mfg. Corp., New York.



Type NM Multi-stage Centrifugal Pump for high pressure work—Bulletin 53.



Combination Steam and Centrifugal Outfit for heating systems—Bulletin 58.



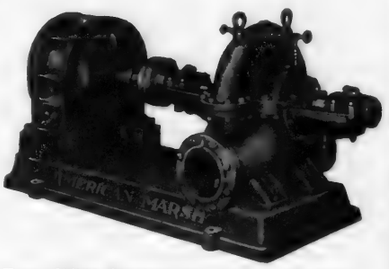
Automatic Centrifugal Sump Pump for drainage and sewage handling—Bulletin 41.

Modern-Rugged-Efficient

THE next time you have a pumping problem, you will do well to send us an inquiry. For over forty years this organization has built pumps and pumps only. They are not a side issue with us, but the main line—and that accounts for the difference. We have concentrated; become specialists in pump building and pump application.

But we do make all types of pumps, centrifugal, steam and power driven equipment. And it is equipment which has met the test of dependable, low-cost service and which has received the endorsement of engineers generally. Write for Bulletins.

AMERICAN STEAM PUMP CO., BATTLE CREEK, MICHIGAN



Type HBM Single-stage Centrifugal Pump for general service—Bulletin 38.

AMERICAN-MARSH

Centrifugal and Steam Pumping Equipment

CENTRAL STATION STEAM CO.

2912 East Woodbridge St.
DETROIT, MICHIGAN

MANUFACTURERS OF

Cadillac Condensation Meters
Detroit Feed Water Meters

Packingless Expansion Joints and other special fittings for underground steam distribution mains.

ROSS

Crosshead-GUIDED Expansion Joint Excels in

Design, Construction and Workmanship
Over 60% of sales—Repeat Orders
Once Used—Always Demanded
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ROSS HEATER & MFG. CO., INC., BUFFALO, N. Y.

New York, Chicago, Philadelphia, Boston, Cleveland, St. Louis, Detroit, Pittsburgh, Baltimore, San Francisco, Seattle, Denver, Salt Lake City, Omaha, Montreal, Toronto.

WEIL PUMPS

For Better Service

Type "A" Single Stage Double Suction Horizontal Split-Case Centrifugal Pump.

Few agencies still open.
Write for Bulletin A-1000.

WEIL PUMP COMPANY

BILGE · SEWAGE · FIRE · HOUSE · CIRCULATING — BOILER FEED · CONDENSATION · VACUUM

Manufacturers of Better Centrifugal Pumps
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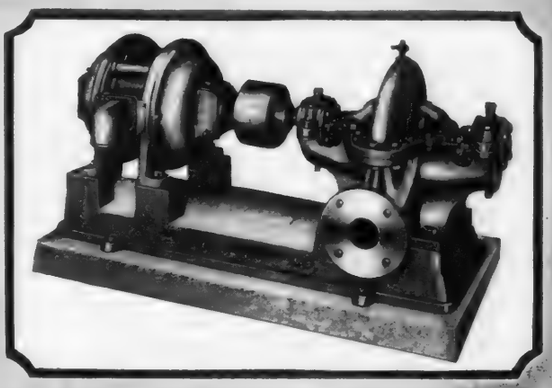


Powers Regulator Co., Chicago, Ill.
United States Radiator Corp., Detroit, Mich.

THERMOSTATS

Absolute Con-Tac-Tor Corp., Elkhart, Ind.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Johnson Service Co., Milwaukee, Wis.
Mercoid Corporation, Chicago, Ill.
Modine Mfg. Co., Racine, Wis.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.
Thrush & Co., H. A., Peru, Ind.
United States Radiator Corp., Detroit, Mich.

TRAPS, BUCKET

Swartwout Co., The, Cleveland, Ohio.
Trerice Co., H. O., Detroit, Mich.

TRAPS, FLOAT

Connor Co., Inc., The W. B., New York.
General Air Filters Corp., New York.
Sarco Co., Inc., New York.
Swartwout Co., The, Cleveland, Ohio.

TRAPS, INVERTED BUCKET (STEAM AND AIR)

Armstrong Machine Works, Three Rivers, Mich.

TRAPS, LIFTING

Lytton Mfg. Corp., Franklin, Va.
Swartwout Co., The, Cleveland, Ohio.

TRAPS, RADIATOR

American District Steam Co., North Tonawanda, N. Y.
Armstrong Machine Works, Three Rivers, Mich.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Johns-Manville Corp., New York.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Sarco Co., Inc., New York.
Stay-Rite Co., Inc., Cleveland, Ohio.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
United States Radiator Corp., Detroit, Mich.
Vapor Engineering Co., New York.
Webster & Co., Warren, Camden, N. J.

TRAPS, RETURN

American Blower Co., Detroit, Mich.
American District Steam Co., North Tonawanda, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Johns-Manville Corp., New York.
Kieley & Mueller, Inc., New York.
Lytton Mfg. Corp., Franklin, Va.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Sarco Co., Inc., New York.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Stay-Rite Co., Inc., Cleveland, Ohio.
Sterling Engineering Co., Milwaukee, Wis.
Swartwout Co., The, Cleveland, Ohio.
Trane Co., The, LaCrosse, Wis.
Webster & Co., Warren, Camden, N. J.

TRAPS, STEAM

American Blower Co., Detroit, Mich.
American District Steam Co., North Tonawanda, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Clow & Sons, James B., Chicago, Ill.
Connor Co., Inc., The W. B., New York.
Davis Engineering Corp., New York.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
General Air Filters Corp., New York.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Johns-Manville Corp., New York.
Kieley & Mueller, Inc., New York.
Lytton Mfg. Corp., Franklin, Va.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.
Trerice Co., H. O., Detroit, Mich.

TRAPS, VACUUM

American Blower Co., Detroit, Mich.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Dunham Co., C. A., Chicago, Ill.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Lytton Mfg. Corp., Franklin, Va.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Sarco Co., Inc., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Swartwout Co., The, Cleveland, Ohio.
Trane Co., The, LaCrosse, Wis.
Webster & Co., Warren, Camden, N. J.

TUBING, COPPER AND BRASS

Wolverine Tube Co., Detroit, Mich.

TURBINES, STEAM

Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.

TURBO-BLOWERS

Bayley Blower Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Garden City Fan Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Wing Mfg. Co., L. J., New York.

UNDERGROUND PIPE CONDUITS

American District Steam Co., North Tonawanda, N. Y.
Johns-Manville Corp., New York.
Ric-wiL Co., The, Cleveland, Ohio.
Wyckoff & Son Co., A., Elmira, N. Y.

VACUUM CLEANING APPARATUS

American Radiator Co., Buffalo, N. Y.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

VALVES, ACID RESISTING

Duriron Company, Inc., The, Dayton, O.

VALVES, AIR, AUTOMATIC

American Radiator Co., Buffalo, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Dunham Co., C. A., Chicago, Ill.
Fulton Sylphon Co., Knoxville, Tenn.
Hoffman Specialty Co., New York.
Jenkins Bros., New York.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Page Boiler Co., Wm. H., New York.
Powers Regulator Co., Chicago, Ill.
Russell & Co., W. A., New York.
United States Radiator Corp., Detroit, Mich.

VALVES, AIR RELIEF

American Radiator Co., Buffalo, N. Y.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Davis Regulator Co., G. M., Chicago, Ill.
Gorton Heating Corporation, New York.
McAlear Mfg. Co., Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Sarco Co., Inc., New York.
Stay-Rite Co., Inc., Cleveland, Ohio.
Trane Co., The, LaCrosse, Wis.

VALVES, BACK PRESSURE

Davis Regulator Co., G. M., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Schutte & Koerting Co., Philadelphia, Pa.
Walworth Co., New York

VALVES, BALANCED

Davis Regulator Co., G. M., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Schutte & Koerting Co., Philadelphia, Pa.

VALVES, BLOW-OFF

Jenkins Bros., New York.
Lytton Mfg. Corp., Franklin, Va.
National Radiator Corp., Johnstown, Pa.
Walworth Co., New York

VALVES, CHECK

Dunham Co., C. A., Chicago, Ill.
Grinnell Co., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Milwaukee Valve Co., Milwaukee, Wis.
Schutte & Koerting Co., Philadelphia, Pa.
Walworth Co., New York.

VALVES, FLOAT

Absolute Con-Tac-Tor Corp., Elkhart, Ind.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Grinnell Co., Providence, R. I.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Schutte & Koerting Co., Philadelphia, Pa.

VALVES, GATE

American District Steam Co., North Tonawanda, N. Y.
Grinnell Co., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Marsh Valve Co., Dunkirk, N. Y.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Walworth Co., New York.

VALVES, GLOBE, ANGLE & CROSS

Grinnell Co., Providence, R. I.
Illinois Malleable Iron Co., Chicago, Ill.
Jenkins Bros., New York.
Marsh Valve Co., Dunkirk, N. Y.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Powers Regulator Co., Chicago, Ill.
Schutte & Koerting Co., Phila., Pa.
Walworth Co., New York.

VALVES, HYDRAULIC-OPERATING

Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
Walworth Co., New York

VALVES, MAGNETIC

Absolute Con-Tac-Tor Corp., Elkhart, Ind.

VALVES, NON-RETURN

Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Grinnell Co., Providence, R. I.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
National Radiator Corp., Johnstown, Pa.
Schutte & Koerting Co., Philadelphia, Pa.
Walworth Co., New York

VALVES, RADIATOR

American District Steam Co., North Tonawanda, N. Y.
American Radiator Co., Buffalo, N. Y.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Capitol Brass Works, Detroit, Mich.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Fulton Sylphon Co., Knoxville, Tenn.
Gorton Heating Corporation, New York.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Marsh & Co., Jas. P., Chicago, Ill.
Marsh Valve Co., Dunkirk, N. Y.
Milwaukee Valve Co., Milwaukee, Wis.
National Radiator Corp., Johnstown, Pa.
Page Boiler Co., Wm. H., New York.
Pierce, Butler & Pierce Mfg. Corp., New York.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.
Schutte & Koerting Co., Philadelphia, Pa.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Stay-Rite Co., Inc., Cleveland, Ohio.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., The, LaCrosse, Wis.
United States Radiator Corp., Detroit, Mich
Vapor Engineering Co., New York.
Walworth Co., New York
Webster & Co., Warren, Camden, N. J.

VALVES, REDUCING

(See Regulators, Pressure).

VALVES, REGULATING

Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., The, Waterbury, Conn.
Davis Regulator Co., G. M., Chicago, Ill.
Fulton Sylphon Co., Knoxville, Tenn.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kainer & Company, Chicago, Ill.
Kieley & Mueller, Inc., New York.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Mueller Co., Decatur, Ill.
Powers Regulator Co., Chicago, Ill.
Sarco Co., Inc., New York.
Walworth Co., New York

VALVES, RELIEF (WATER)

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Davis Regulator Co., G. M., Chicago, Ill.
Kainer & Company, Chicago, Ill.
Mason Regulator Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Mueller Co., Decatur, Ill.
National Radiator Corp., Johnstown, Pa.
Thrush & Co., H. A., Peru, Ind.
United States Radiator Corp., Detroit, Mich.

VALVES, SAFETY

Absolute Con-Tac-Tor Corp., Elkhart, Ind.
American District Steam Co., North Tonawanda, N. Y.
American Radiator Co., Buffalo, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Jenkins Bros., New York.
National Radiator Corp., Johnstown, Pa.
Stay-Rite Co., Inc., Cleveland, Ohio.
United States Radiator Corp., Detroit, Mich.
Walworth Co., New York

VALVES, STOP AND CHECK

(See Valves, Non-Return).

VENTILATING SYSTEMS

American Blower Co., Detroit, Mich.
American Radiator Co., Buffalo, N. Y.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Connor Co., Inc., The W. B., New York.
Garden City Fan Co., Chicago, Ill.
General Air Filters Corp., New York.
Lakeside Company, The, Hermansville, Mich.
Nelson Corp., Herman, The, Moline, Ill.
Seymour, James M., Newark, N. J.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.
Typhoon Fan Co., New York.

VENTILATING SYSTEMS, ACID

Duriron Company, Inc., The, Dayton, O.

VENTILATORS

Bayley Blower Co., Milwaukee, Wis.
DeBothezat Impeller Co., Inc., New York
Midwest Air Filters, Inc., Bradford, Pa.
Seymour, James M., Newark, N. J.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

VENTILATORS, MUSHROOM

Aeolus Dickinson Co., Chicago, Ill.
American Blower Co., Detroit, Mich.
American Metal Products Corp., St. Louis, Mo.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Knowles Mushroom Ventilator Co., New York.
Ventilating Products Co., Chicago, Ill

VENTILATORS, ROOF

Aeolus Dickinson Co., Chicago, Ill.

VENTILATORS, UNIT

American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Blower Co., Milwaukee, Wis.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
DeBothezat Impeller Co., Inc., New York
Dwyer Equipment Co., Chicago, Ill.
Garden City Fan Co., Chicago, Ill.
Nelson Corp., Herman, The, Moline, Ill.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Peerless Unit Ventilation Co., Inc., New York.
Sturtevant Co., B. F., Hyde Park, Boston, Mass.

WATER STERILIZERS

Clow & Sons, James B., Chicago, Ill

WEATHER STRIPS, METAL

Athey Co., Chicago, Ill.

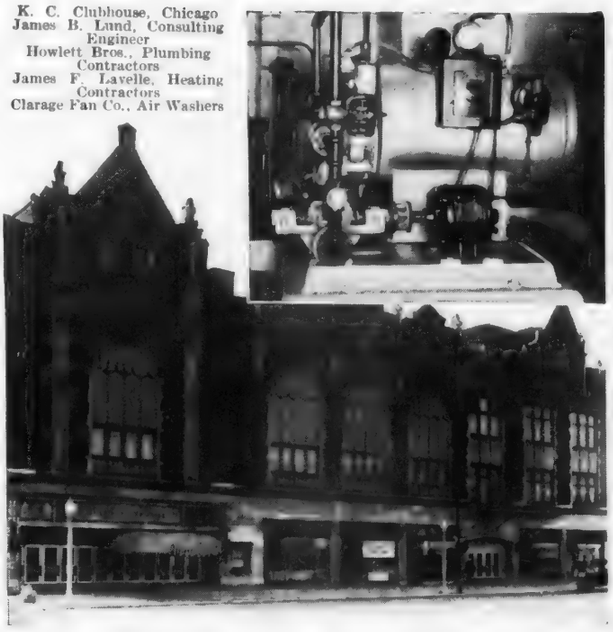
WELDERS, ELECTRIC ARC

Lincoln Electric Co., Cleveland, Ohio

WRENCHES, STILLSON

Walworth Co., New York.

K. C. Clubhouse, Chicago
James B. Lund, Consulting Engineer
Howlett Bros., Plumbing Contractors
James F. Lavelle, Heating Contractors
Clarage Fan Co., Air Washers



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2 2SM House Supply Pumps
1 1¼ Swimming Pool Circulating Pump
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2 2½ SS Air Washer Pumps
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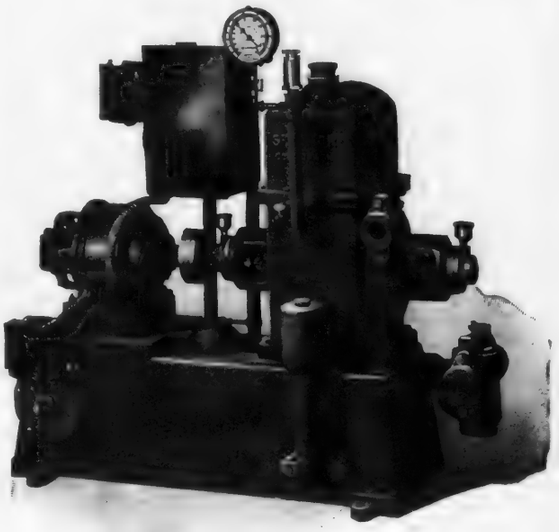
SKIDMORE



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high or low water line in the system when operating on float control?

The Skidmore pump on interceptor base is designed to give low water line operation without pitting.

The unit is self contained, ball bearing, and operated by one motor. It produces vacuum on the system even when operating on float control, a desirable feature.

The unit consists of two pumps in one housing on one shaft, an air pump and a centrifugal pump for boiler feed. Motor and pump are mounted directly on interceptor base. This construction means compactness in design and minimum floor space occupied.

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Canadian Representatives, Darling Bros., Limited
120 Prince Street, Montreal

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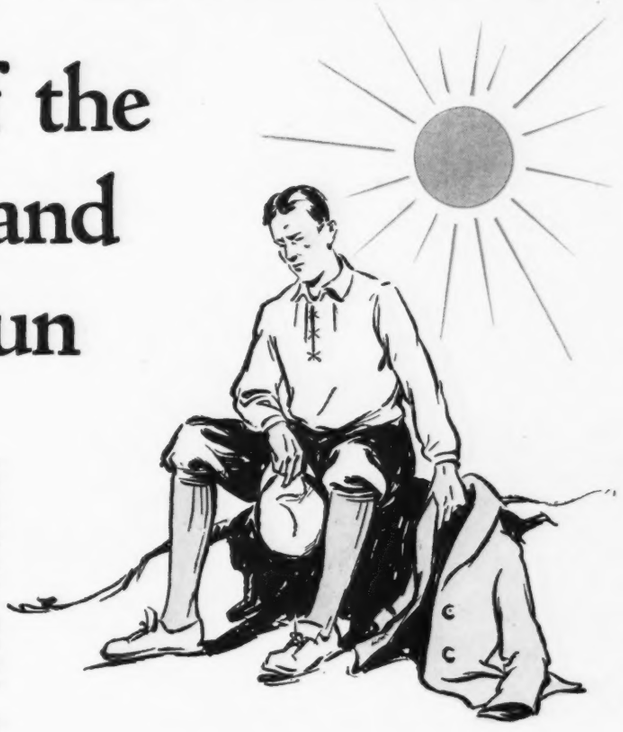
HAINES

AFTER ALL

Your vacuum heating system is no more efficient than your Radiator Traps permit it to be.

Fable of the Wind and the Sun



There was once a dispute as to which was the stronger—the wind or the sun. They agreed to settle the matter by seeing which could soonest make a traveler take off his coat. So the wind blew fierce, trying to blow the coat off, but the traveler only wrapped it around him the tighter. Then the sun came out and, under its genial warmth, the traveler soon sat down and cast his coat on the ground.

—*Aesop's Fables* (revised)

In very much the same way, you sometimes see heating contractors trying to *force* sales by featuring a low price, only to find that prospects, losing confidence in their bids, wrap themselves the tighter in a cloak of doubt and suspicion.

How much wiser the heating contractor who employs *persuasion*, instead of force. How much surer of success is he who wins his jobs under the genial warmth of quality assurances that melt away suspicion and resistance.

If you ask a fair profit and submit with your bid, distinctive quality features such as Weil-McLain corrugated heating surfaces, long back-and-forth fire travel and scientific combustion, you are taking the pleasantest, easiest path to business growth and success.

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Boiler Factory—Michigan City, Ind.
Radiator Factory—Erie, Pa.

Fight fuel waste with

Weil-McLain
SCIENTIFIC COMBUSTION
BOILERS
in 1928

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.. again ..

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